San Gabriel Valley Areas 1, 2, and 4 Superfund Sites

Los Angeles County, California

R E C O R D O F D E C I S I O N

for

S U B U R B A N W A T E R S Y S T E M S

B A R T O L O W E L L F I E L D

O P E R A B L E U N I T

United States Environmental Protection Agency

Region 9 -- San Francisco, California

September 1988

San Gabriel Valley Areas 1, 2, and 4 Sites

RECORD OF DECISION FOR SUBURBAN WATER SYSTEMS
BARTOLO WELL FIELD OPERABLE UNIT

Concurrence -- Superfund Program

Neil Ziemba — 9/25/88
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San Gabriel Valley Areas 1, 2, and 4 Sites

RECORD OF DECISION FOR SUBURBAN WATER SYSTEMS
BARTOLO WELL FIELD OPERABLE UNIT

Concurrence -- Toxics & Waste Management Division

Jeff Zelikson
Director
Toxics & Waste Management Division

9-28-88
Date

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

26 SEP 1988

MEMORANDUM

SUBJECT: San Gabriel Valley Areas 1, 2, and 4 Sites, Suburban Water Systems Bartolo Well Field Operable Unit Record of Decision

FROM: Jeff Zeiksom, Director
Toxics & Waste Management Division

TO: Nancy J. Marvel, Regional Counsel
Office of Regional Counsel

Please find enclosed for your concurrence the Final Record of Decision (ROD) for the San Gabriel Valley Area 1, 2, and 4 sites, Suburban Water Systems Bartolo Well Field Operable Unit in Los Angeles County, California. This document was submitted for review by your staff and we know of no unresolved issues. If you have any questions about this ROD, please contact Jon Wactor (ORC) at 4-8042 or Neil Ziemba (T-4-1) at 4-7174. Neil would appreciate receiving this concurrence sheet by COB Tuesday, September 27, or Wednesday morning, September 27 at the latest, so that the ROD can be transmitted to the RA for signature as scheduled on September 27. Please contact Lynn Trujillo, secretary of the Superfund Remedial Branch, at 4-8910 so that your concurrence sheet can be collected after you have signed it.

Please sign below if you are in agreement with the following statement:

The enclosed Record of Decision package for the San Gabriel Valley Areas 1, 2, and 4 sites, Suburban Water Systems Bartolo Well Field Operable Unit in Los Angeles County, California has been reviewed and I concur with the contents.

Sept. 27, 1988
Date

Nancy J. Marvel
Nancy J. Marvel
Regional Counsel
Office of Regional Counsel

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

26 SEP 1988

MEMORANDUM

SUBJECT: San Gabriel Valley Areas 1, 2, and 4 Sites, Suburban Water Systems Bartolo Well Field Operable Unit Record of Decision

FROM: Jeff Zelikson, Director
Toxics & Waste Management Division

TO: Harry Seraydarian, Director
Water Management Division

Please find enclosed for your concurrence the Final Record of Decision (ROD) for the San Gabriel Valley Area 1, 2, and 4 sites, Suburban Water Systems Bartolo Well Field Operable Unit in Los Angeles County, California. This document was submitted for review by your staff and we know of no unresolved issues. If you have any questions about this ROD, please contact Jon Wactor (ORC) at 4-8042 or Neil Ziemba (T-4-1) at 4-7174. Neil would appreciate receiving this concurrence sheet by COB Tuesday, September 27, or Wednesday morning, September 27 at the latest, so that the ROD can be transmitted to the RA for signature as scheduled on September 27. Please contact Lynn Trujillo, secretary of the Superfund Remedial Branch, at 4-8910 so that your concurrence sheet can be collected after you have signed it.

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9-26-88
Date

Keith Takata
Harry Seraydarian
for Director
Water Management Division

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

26 SEP 1988

MEMORANDUM

SUBJECT: San Gabriel Valley Areas 1, 2, and 4 Sites, Suburban Water Systems Bartolo Well Field Operable Unit Record of Decision

FROM: Jeff Zelikson, Director
Toxics & Waste Management Division

TO: David Howekamp, Director
Air Management Division

Please find enclosed for your concurrence the Final Record of Decision (ROD) for the San Gabriel Valley Area 1, 2, and 4 sites, Suburban Water Systems Bartolo Well Field Operable Unit in Los Angeles County, California. This document was submitted for review by your staff and we know of no unresolved issues. If you have any questions about this ROD, please contact Jon Wactor (ORC) at 4-8042 or Neil Ziemba (T-4-1) at 4-7174. Neil would appreciate receiving this concurrence sheet by COB Tuesday, September 27, or Wednesday morning, September 27 at the latest, so that the ROD can be transmitted to the RA for signature as scheduled on September 27. Please contact Lynn Trujillo, secretary of the Superfund Remedial Branch, at 4-8910 so that your concurrence sheet can be collected after you have signed it.

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9/28/88
Date

David Howekamp
Director
Air Management Division

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

26 SEP 1988

MEMORANDUM

SUBJECT: San Gabriel Valley Areas 1, 2, and 4 Sites, Suburban Water Systems Bartolo Well Field Operable Unit Record of Decision

FROM: Jeff Zeliksons, Director
Toxics & Waste Management Division

TO: Nora McGee, Assistant Regional Administrator
Office of Policy and Management

Please find enclosed for your concurrence the Final Record of Decision (ROD) for the San Gabriel Valley Area 1, 2, and 4 sites, Suburban Water Systems Bartolo Well Field Operable Unit in Los Angeles County, California. This document was submitted for review by your staff and we know of no unresolved issues. If you have any questions about this ROD, please contact Jon Wactor (ORC) at 4-8042 or Neil Ziemba (T-4-1) at 4-7174. Neil would appreciate receiving this concurrence sheet by COB Tuesday, September 27, or Wednesday morning, September 27 at the latest, so that the ROD can be transmitted to the RA for signature as scheduled on September 27. Please contact Lynn Trujillo, secretary of the Superfund Remedial Branch, at 4-8910 so that your concurrence sheet can be collected after you have signed it.

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9/27/88
Date

for Nora McGee
Assistant Regional Administrator
Office of Policy and Management

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

26 SEP 1988

MEMORANDUM

SUBJECT: San Gabriel Valley Areas 1, 2, and 4 Sites, Suburban Water Systems Bartolo Well Field Operable Unit Record of Decision

FROM: Jeff Zeliksor, Director
Toxics & Waste Management Division

TO: John Wise
Deputy Regional Administrator

Please find enclosed for your concurrence the Final Record of Decision (ROD) for the San Gabriel Valley Area 1, 2, and 4 sites, Suburban Water Systems Bartolo Well Field Operable Unit in Los Angeles County, California. We would appreciate receiving your concurrence by COB Tuesday, September 27, or Wednesday morning, September 27 at the latest, so that the ROD can be transmitted to the RA for signature as scheduled on September 27. Please have your secretary contact Lynn Trujillo, secretary of the Superfund Remedial Branch, at 4-8910 so that your concurrence sheet can be collected after you have signed it.

Please sign below if you are in agreement with the following statement:

The enclosed Record of Decision package for the San Gabriel Valley Areas 1, 2, and 4 sites, Suburban Water Systems Bartolo Well Field Operable Unit in Los Angeles County, California has been reviewed and I concur with the contents.

9.26.88
Date

John Wise
John Wise
Deputy Regional Administrator

RECORD OF DECISION

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RECORD OF DECISION

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RECORD OF DECISION

DECLARATION

SITE NAME AND LOCATION

San Gabriel Valley Areas 1, 2, and 4
Los Angeles County, California

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the San Gabriel Valley Areas 1, 2, and 4 sites, in Los Angeles County, California, developed in accordance with CERCLA, as amended by SARA, and the National Contingency Plan. This decision is based on the administrative record for these sites. The attached index identifies the items that comprise the administrative record upon which the selection of the remedial action is based.

The State of California concurs on the selected remedy.

DESCRIPTION OF THE SELECTED REMEDY

This remedial action is the second to be taken at the site. In a May 1984 Record of Decision (ROD) and a subsequent September 1987 ROD Amendment, EPA selected a remedy to address the public health threat posed by volatile organic compound (VOC) contamination of the public water supply wells of three small mutual water companies in El Monte. The first remedial action is currently in the construction phase. The remedial action selected in this decision document--the Suburban Water Systems Bartolo Well Field Operable Unit--is designed to achieve two objectives: (1) to partially control the movement and spread of contaminants in the Whittier Narrows area of the San Gabriel Valley, thereby contributing to aquifer restoration at the San Gabriel Valley Areas 1, 2, and 4 sites; and (2) to address the potential public health threat posed by contamination of SWS's Bartolo Well Field.

This remedial action is the first phase of a larger remedial action planned for the Whittier Narrows area to control the migration of contamination into Central Basin to the south, where additional public water supply wells are threatened by contamination. A RI/FS is currently being conducted to develop an overall Whittier Narrows Operable Unit and is expected to be released for public comment in 1989, leading to a Record of

Decision by January 1990. The remedial action selected in this decision document will be incorporated into the remedial action for the entire Whittier Narrows area.

This remedial action addresses a small part of the overall groundwater contamination problem in the San Gabriel Valley Areas 1, 2, and 4 sites. It is expected that several additional operable units will be planned to address other aspects of the San Gabriel sites' contamination problems; identification of future operable units is currently underway.

The remedial action selected in this decision document incorporates the following components:

- o extraction of groundwater from the existing wells in Suburban Water Systems' Bartolo Well Field and, if feasible, modification of the existing wells and/or installation of new production wells to selectively extract groundwater from the most highly contaminated zones of the underlying aquifer;

- o construction of a packed tower air stripping system to treat contaminated groundwater on Suburban Water Systems property at the Bartolo Well Field. Since this location is within the 100-year floodplain of the San Gabriel River, appropriate floodproofing measures will be incorporated into the treatment system design to minimize the damage to the facilities in the event of flooding and to limit the downtime necessary after a flood event to prepare the system to return to operation;

- o installation of a vapor-phase GAC off-gas treatment system to control VOC air emissions from the air stripping system;

- o treatment of contaminated water to contaminant concentrations below MCLs that results in a cumulative cancer risk level of 10^{-6} or less; and

- o use of the treated groundwater as water supply for SWS's customers by feeding the treated water directly into SWS's water distribution system.

DECLARATION

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate for this remedial action, and is cost-effective. This remedy satisfies the statutory

preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. As part of the remedy, groundwater monitoring will be conducted to track contaminant levels in the Bartolo Well Field and to monitor the performance of the treatment system to ensure adequate protection of human health and the environment.

Daniel W. McGovern
Regional Administrator

9.29.88
Date

RECORD OF DECISION

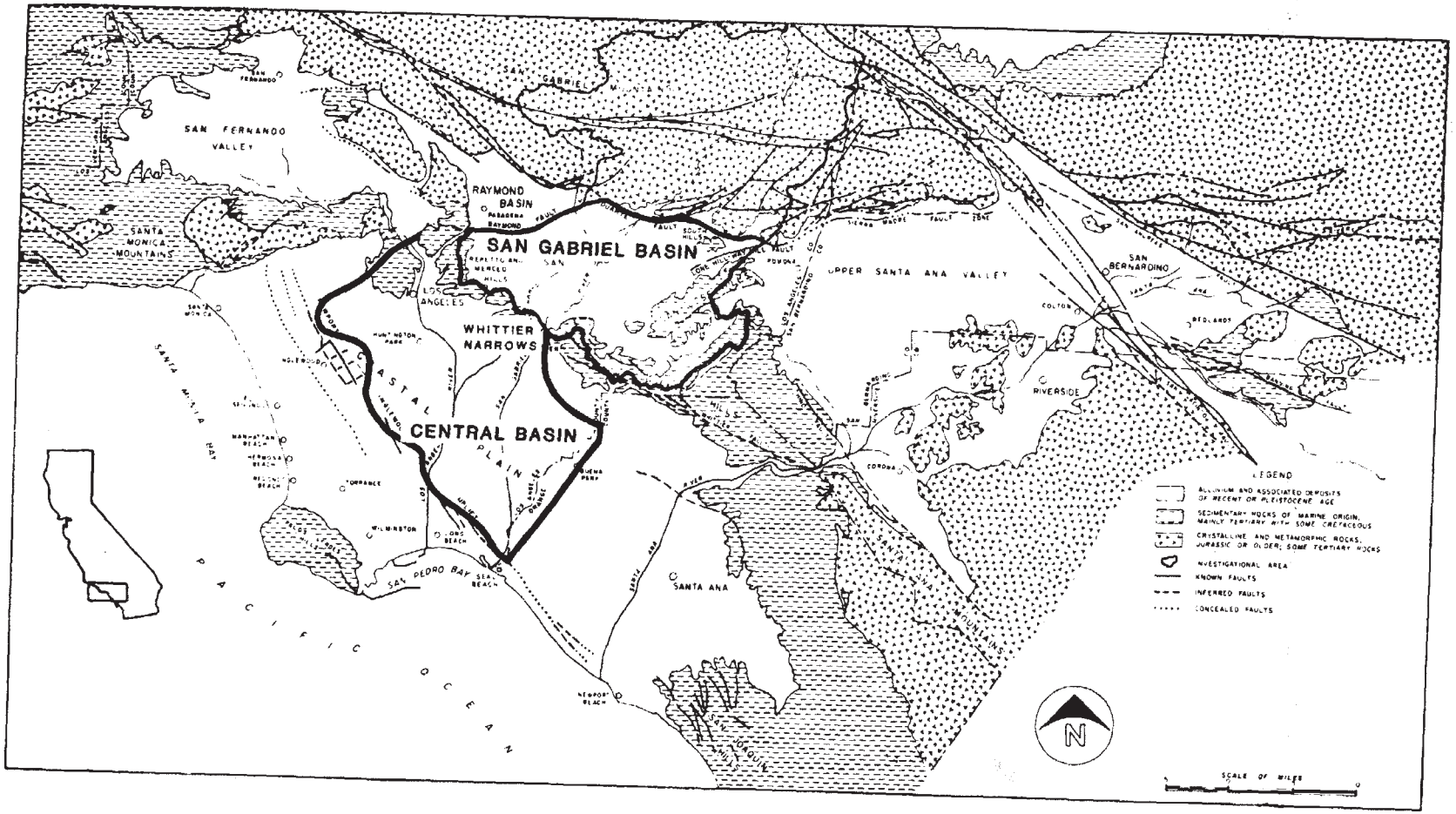
DECISION SUMMARY

1.0 SITE LOCATION AND DESCRIPTION

The San Gabriel Valley Areas 1-4 sites are located approximately 10-20 miles east of Los Angeles in Los Angeles County in southern California (Figure 1). The sites are four large areas of groundwater contamination that underlie significant portions of the cities of Azusa, Baldwin Park, La Puente, City of Industry, West Covina, El Monte, South El Monte, Monrovia, Arcadia, Rosemead, Alhambra, and other municipalities or unincorporated areas of the San Gabriel Valley. The general areas of contamination associated with the four San Gabriel Sites are shown in Figure 2. The sites include industrial, commercial, residential, as well as undeveloped areas.

The San Gabriel Valley is an alluvial basin bounded by the San Gabriel Mountains, which rise up to 10,000 feet in the north, and to the east, southeast, southwest, and west by a series of low-level (under 1000 feet) sedimentary hills--the San Jose, Puente, Merced, and Repetto Hills. The major surface water drainage in the San Gabriel Valley is the San Gabriel and Rio Hondo Rivers which flow from the northeast to the southeast where they flow from the valley through the Whittier Narrows, a two-mile gap between the Merced and Puente Hills. There is typically no flow in the rivers during the summer dry season except near the Whittier Narrows area, where the flow is primarily a combination of sewage treatment plant effluent and groundwater discharge. The valley is a broad plain that slopes at an average of 65 feet per mile from the foot of the San Gabriel Mountains toward Whittier Narrows.

The Main San Gabriel Groundwater Basin, which underlies the San Gabriel Valley, consists primarily of highly permeable gravel and cobble deposits. Numerous interbedded lenses of clays also occur, particularly in the southern portion of the basin and near the surrounding hills. Regional groundwater flow velocities range as high as 1000 feet per year. Groundwater flows generally in the same pattern as the surface water drainage with subsurface drainage flowing out of the San Gabriel Basin through the Whittier Narrows area into Central Basin to the south. In some areas of the valley, however, such as in the west valley near San Gabriel, large-scale groundwater pumping has resulted in a reversal of the historical groundwater flow direction. Groundwater also discharges to surface water along San Jose Creek in the southeast portion of the valley and in the San Gabriel and



SOURCE: CDWR, 1966

FIGURE 1
LOCATION AND GENERAL GEOLOGY
OF SAN GABRIEL BASIN

Rio Hondo Rivers near Whittier Narrows. Substantial recharge of groundwater occurs in the unlined San Gabriel river bed and in spreading basins located in the northern portion of the valley.

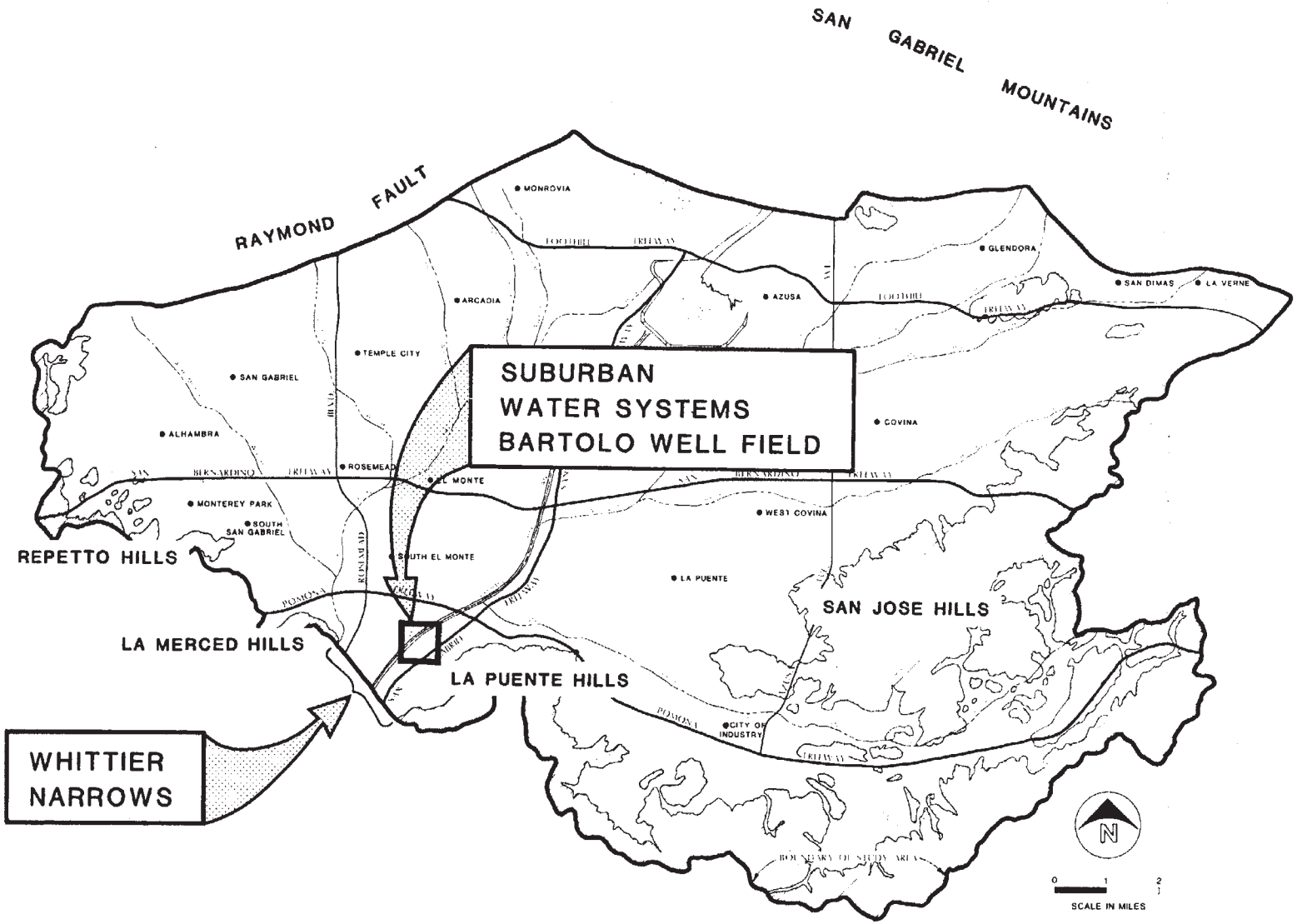
The San Gabriel Basin provides over 90% of the water supply for a population of over 1 million people. Forty-five different water purveyors extract groundwater from the basin, as well as additional commercial/industrial users. Water rights within the basin have been adjudicated. Water rights for the basin's pumpers have been determined as a percentage of the Operating Safe Yield, which is established annually by the Main San Gabriel Basin Watermaster based on water level measurements within the basin. The location and quantity of groundwater pumped is not controlled, however, an assessment fee is charged for any pumping in excess of water rights. The assessment fee is essentially a charge for the purchase of imported surface water to be artificially recharged in the basin to replace the excess groundwater pumped.

In addition to the intrabasin adjudication, there is also an adjudication of water rights between users of the Main San Gabriel Basin and Central Basin to the south (see Figure 1). This interbasin adjudication guarantees an average annual usable flow (groundwater plus surface water) into Central Basin through Whittier Narrows. If the guaranteed flow requirement is not met, the Main San Gabriel water users must pay for the purchase of replacement surface water that is used for artificial recharge of Central Basin just south of Whittier Narrows.

The subject of this Record of Decision, Suburban Water Systems'(SWS) Bartolo Well Field, consists of four public water supply wells located along the east side of the San Gabriel River in the Whittier Narrows area (Figure 3). The contamination in this area may be associated with either the San Gabriel Valley Areas 1, 2, or 4 sites (see § 6.0, page 9) or some combination thereof. These four wells provide about 55-60% of the water supply for approximately 17,000 commercial and residential water customers in SWS's Whittier Service District. In addition, the Bartolo Well Field provides a small percentage of the water supply for the neighboring La Mirada Service District. SWS is a private water utility with numerous groundwater wells in the San Gabriel Valley.

2.0 SITE HISTORY

Prior to World War II, the San Gabriel Valley was primarily an agricultural area. During the war, several industries that



LEGEND

BEDROCK OUTCROPS

FIGURE 3
LOCATION OF SUBURBAN WATER SYSTEMS
BARTOLO WELL FIELD

used large amounts of industrial solvents were located in the valley. This was followed by the rapid development of industrial/commercial and residential areas in the valley during the postwar period. Today, many different industries in the valley are large users of the chlorinated solvents that have contaminated groundwater in the basin. Given this history of industrial development, in all likelihood the contamination of the groundwater basin began as early as the increase in industrial activity during the war. Recent investigations of potential sources of groundwater contamination by the Los Angeles Regional Water Quality Control Board have indicated that the basin's contamination is the cumulative result of the solvent and waste handling and disposal practices of dozens of different industrial/commercial facilities located throughout the valley.

Groundwater contamination by volatile organic compounds (VOC) was first detected in the valley when Aerojet Electrosystems in Azusa sampled a nearby groundwater well owned by Valley County Water District and found 1800 parts per billion (ppb) of trichloroethylene (TCE). Subsequent sampling by the California Department of Health Services (DHS) and the Los Angeles County Department of Health Services identified over 50 wells contaminated with TCE, perchloroethylene (also known as tetrachloroethylene or PCE), or carbon tetrachloride (CTC) at concentrations above the action levels established by DHS. The action levels are those concentrations above which DHS recommends that public water suppliers take action to reduce the level of contamination in drinking water supplies; they have been set at 5, 4, and 5 ppb, respectively, for TCE, PCE, and CTC. All water purveyors in the San Gabriel Valley, except for three small mutual water companies in El Monte, were able to supply water that met the DHS action levels by a combination of shutting down the most highly contaminated wells, blending water from contaminated wells with water from clean wells, or using simple aeration systems for treatment of water contaminated with low levels of VOCs.

Four areas of groundwater contamination in the San Gabriel Valley, designated as San Gabriel Valley Areas 1-4, were proposed for inclusion on the National Priorities List in September 1983, attaining final NPL status in May 1984. A San Gabriel Management Committee was established by DHS in 1983 for the purposes of coordinating remedial action in the San Gabriel Valley. The committee, which consisted of representatives of EPA, state and local regulatory agencies, water purveyors, and a public interest group, agreed on three primary goals: (1) take immediate action to supply the three mutual water companies in El Monte with a clean water supply that meets DHS action levels; (2) identify the

sources of groundwater contamination and take action to control existing sources; and (3) develop a long-term strategy for remedial action in the San Gabriel Basin.

To address the first goal, EPA prepared a focused feasibility study (FFS) to evaluate interim remedial measures (IRM) to solve the water quality problems of the three mutuals in El Monte. The FFS was released for public comment in December 1983 and a Record of Decision (ROD) selecting air stripping treatment as the IRM action was signed in May 1984. Subsequent to the May 1984 ROD, a pre-design study was initiated that led to substantial revisions to the cost estimates for the alternatives considered in the FFS. Based on the revised cost estimates, EPA proposed in October 1986 to revise its remedy selection for the IRM and instead select installation of carbon adsorption treatment systems for the three mutuals. After a public comment period, an amendment to the 1984 ROD changing the remedy selected to carbon adsorption was signed in September 1987. Construction of a treatment system for one of the mutual water companies--Richwood Mutual Water Company--is currently underway. Design of a treatment system for a second mutual water company--Rurban Homes--was completed, but construction was put on hold as VOC levels in their wells have dropped below DHS action levels. The third mutual water company involved--Hemlock--declined EPA assistance and has installed a carbon adsorption treatment system on its own.

To address the second management committee goal, EPA and state agencies have conducted several activities to identify potential sources of VOC contamination within the basin (see § 3.0, Enforcement, for further discussion). The third management committee goal is the focus of the San Gabriel sites remedial investigation/feasibility study (RI/FS). An overall RI/FS for all of the San Gabriel sites is being conducted rather than a separate RI/FS for each site. EPA is managing the sites through one large basinwide study because all of the areas of contamination are located in one hydraulically-connected basin, where actions to address the contamination in one area may have a significant effect on the contamination in nearby areas.

The RI/FS for the San Gabriel sites was initiated by EPA in 1984 with a preliminary investigation termed the Supplemental Sampling Program (SSP). This investigation, which was completed in May 1986 with the release of a draft report, included the sampling of 70 existing groundwater wells for a full range of organic chemical contamination, collection and evaluation of existing data, and regional groundwater flow modeling. The EPA sampling was coordinated with sampling conducted by water

purveyors under a new state law (Assembly Bill 1803) and by DHS, so that a total of 195 existing wells were sampled in 1985. The primary findings of the SSP were:

- o VOCs were the only major organic contaminants affecting public water supply wells in the basin;
- o the areas of contamination were much larger than previously thought based on sampling data obtained prior to 1985;
- o the potential for significant migration of contamination was great and a large number of currently clean wells were threatened by contamination;
- o contamination may potentially migrate through Whittier Narrows into Central Basin, thereby threatening additional wells; and
- o use of an alternative water supply (imported surface water) to replace the contaminated groundwater supply in the San Gabriel basin was not feasible on a regional basis.

The modeling results from the SSP showed that 36 wells were potentially threatened by contamination above DHS action levels and EPA proposed Maximum Contaminant Levels (MCL) within 5 years if the contamination migrated at the same velocity and direction as regional groundwater flow. In planning for the next phase of the RI/FS, EPA considered whether any operable units should be planned to address the water quality problems of specific water companies, as the IRM had done for the three mutuals. The owners of the 36 wells were invited to a meeting in April 1987 to inform them of their potential problem and to obtain information on the potential public health threat if these wells became contaminated.

Prior to that meeting, in the fall of 1986, SWS contacted EPA concerning contamination at its Bartolo Well Field in Whittier Narrows. VOC levels had recently increased in these wells, which were located directly downgradient of contaminated wells (the Bartolo wells were included on the list of 36 potentially threatened wells). The Bartolo wells provide the major portion of the water supply (over 55 percent) for a population of approximately 70,000 residents of the City of Whittier. In addition, as a center of large capacity pumping in the Whittier Narrows area, the pumping has a potentially large

effect on the migration of contaminants through the Whittier Narrows area into Central Basin. The current pumping capacity of the Bartolo Well Field is approximately 9,300 gallons per minute. When SWS contacted EPA, they had completed a study evaluating various options to provide clean water in the event contaminant levels increased above DHS action levels. After discussions with SWS regarding the Bartolo well field contamination, EPA initiated the Suburban Water Systems Bartolo Well Field Operable Unit Feasibility Study (OUFS) in March 1987 with the goal of evaluating alternatives to address the public health threat posed by contamination of the Bartolo well field, as well as evaluating the role that extraction at the Bartolo Well Field could play in controlling contaminant migration in the Whittier Narrows area. On June 22, 1988, the draft SWS Bartolo Well Field OUFS was released for public comment.

3.0 ENFORCEMENT

The San Gabriel sites were first discovered based on contamination of public supply wells. At the time of listing, the sources of contamination were unknown. EPA and the Los Angeles Regional Water Quality Control Board have conducted numerous activities over the last several years to identify the sources of groundwater contamination in the San Gabriel Valley. In August 1983 and January 1984, EPA issued 88 RCRA Section 3007/CERCLA Section 104 information request letters to facilities suspected of being major users of chlorinated solvents in the San Gabriel Valley. Federal, state, and local agency files pertaining to 49 facilities (including 29 major solvent users as identified by the information request letter responses and 19 landfills in the San Gabriel Valley) were reviewed in 1986-87. Site inspections were also conducted for 6 facilities in the San Gabriel Valley. In 1987 and 1988, EPA issued information request letters to an additional 208 facilities in the Baldwin Park/Azusa area, as well as follow-up information request letters to 12 high priority sites out of the original 88 letter recipients.

The RWQCB began source investigation activities in 1980 with an industrial survey to determine major solvent users in the San Gabriel Valley. The results of this investigation were used to develop EPA's list of the first 88 information request letter recipients. More recently, in 1986, the RWQCB began a major source investigation program called the AB 1803 Followup Program. Under this program, an area (typically one square mile) surrounding contaminated public supply wells was established within which a door-to-door industrial survey would be completed. Inspections are conducted at all facilities potentially using

solvents. Facilities that may have had a release due to their handling or storage practices are requested to conduct a leak detection program for their facility. If soil contamination is found, an expanded soil and groundwater investigation is required. As of this time, the RWQCB is currently involved in investigations in the El Monte, La Puente, and City of Industry areas. Approximately 60 facilities have reached the groundwater investigation phase. EPA plans to provide funding to the RWQCB through a Cooperative Agreement to expand their AB 1803 Followup Program into additional areas of the San Gabriel Valley.

EPA is currently reviewing the RWQCB files to determine which facilities are potential sources of groundwater contamination and should receive general notice letters. Although EPA plans to issue general notice letters in the near future, the investigation is not yet sufficiently advanced to issue special notice letters for implementation of the SWS Bartolo Well Field Operable Unit.

4.0 COMMUNITY RELATIONS

The public comment period for the OUFS and the proposed plan opened on June 22nd and continued through July 22, 1988. A public meeting was held on July 13th at the Whittier Community Center Theatre in Whittier and was attended by approximately 60 people.

Prior to the beginning of the public comment period, EPA published a notice on June 19th in both the San Gabriel Valley Tribune and Whittier Daily News. The notice briefly described the proposed plan and announced the public comment period and the public meeting. The notice also announced the availability of the proposed plan and the draft OUFS for review at the information repositories established at the Whittier Public Library, the La Puente Public Library, the Upper San Gabriel Valley Municipal Water District offices in El Monte, and the EPA Region 9 office in San Francisco.

A fact sheet describing the proposed plan was delivered to all of the information repositories on June 22nd. Copies of the fact sheet were mailed on June 24th to the EPA general mailing list for the San Gabriel sites, which included about 800 names of members of the general public, elected officials, and media representatives. In addition, EPA sent a letter notifying the City Manager of Whittier of the proposed plan and upcoming public meeting. Copies of the proposed plan and draft OUFS report were also provided to the state and local agencies on the San Gabriel

Valley Superfund Project Technical Advisory Committee, the Central and West Basin Replenishment District, and Suburban Water Systems. Intergovernmental review was initiated in a letter of July 22nd through the Governor's Office of Planning and Research/State Clearinghouse.

The OUFS evaluated two different locations for siting of a new water treatment facility. To solicit comment from the community on locating the treatment facility remote from the Bartolo Well Field at the Bartolo Transmission Main High Point alternative site, EPA delivered notices door-to-door in the vicinity of the High Point site. The notices included the proposed plan fact sheet, a map of the Bartolo Well Field/north Whittier area showing the High Point location, and a cover letter encouraging public comment regarding the alternative locations. The delivery was made in two phases. On July 9th, the notices were delivered to about 800 homes in the residential area near the High Point location who were thought to be in visual range of the potential site. On July 13th, notices were delivered to about 2,400 homes located somewhat further from the High Point location.

In addition to EPA's community relations activities, SWS cooperated in notifying their customers of EPA's proposed plan. A notice was mailed on June 22nd to all of their approximately 34,000 customers in the Whittier and La Mirada service districts (who would potentially receive drinking water from the proposed treatment plant). The notice briefly described the OUFS, announced the public comment period and public meeting, and invited SWS's customers to contact SWS to obtain a copy of the proposed plan fact sheet. EPA provided about 800 copies of the fact sheet to SWS that were distributed to customers who called in a request. SWS also sent letters to the City Managers of Whittier and La Mirada notifying them of the proposed plan and the public meeting.

EPA has prepared the attached responsiveness summary, which provides responses to the comments submitted in writing during the public comment period, as well as comments made by attendees at the July 13th public meeting.

5.0 DECISION SCOPE

As discussed in the Site History (page 4), EPA has previously selected a remedy to address the public health threat posed by contamination of the public water supply wells of the three mutual water companies in El Monte. The response action

that is the subject of this decision document constitutes the second EPA remedial action in the San Gabriel Valley and is designed to achieve two objectives:

- o to partially control the movement and spread of contaminants in the Whittier Narrows area of the San Gabriel Valley, thereby contributing to aquifer restoration at the San Gabriel Valley Areas 1, 2, and 4 sites; and

- o to address the potential public health threat posed by contamination of SWS's Bartolo Well Field.

This response action is the first phase of a larger response action planned for the Whittier Narrows area to control the migration of contamination into Central Basin to the south, where additional public supply wells are potentially threatened by contamination. EPA is currently conducting a Whittier Narrows operable unit RI/FS that is scheduled to be released for public comment in 1989, leading to a Record of Decision by January 1990. The response action selected in this decision document will be incorporated into the EPA response action for the entire Whittier Narrows area.

This response action addresses a small part of the overall groundwater contamination problem in the San Gabriel Valley Areas 1,2,and 4 sites. It is expected that several additional operable units will be planned to address other aspects of the the San Gabriel sites' contamination problems. EPA is currently working to identify and set priorities for future operable units that are necessary to address the public health threat posed by the San Gabriel Valley sites.

6.0 NATURE AND EXTENT OF CONTAMINATION

Large areas of the San Gabriel Valley have groundwater contaminated with volatile organic compounds at concentrations that exceed EPA MCLs or DHS action levels (Figure 2). Although there are substantial gaps of data concerning the extent of contamination in the San Gabriel Valley (including areas as large as a mile across for which no groundwater quality data exists), it is known that the regional groundwater flow from the Area 1, 2, and 4 sites is toward the Whittier Narrows area. The areas of contamination shown in Figure 2, which is based on current available groundwater quality data in the San Gabriel Valley, have been drawn conservatively in that if no data is available, the area is assumed to be uncontaminated. Based on regional

groundwater flow patterns and limited available data regarding the vertical extent of contamination (see discussion below), it is highly probable that the "clean" areas separating the contamination in the Whittier Narrows area from the major plume areas in the Area 1, 2, and/or 4 sites are actually contaminated.

Figure 4 shows the maximum historical concentrations of the two primary contaminants of concern, PCE and TCE, in wellhead samples from production wells in the Whittier Narrows area, including the Bartolo Well Field. Based on this data, a map of the areas of groundwater contamination in the Whittier Narrows area has been prepared (Figure 5). The Bartolo Well Field is located near the western edge of the main area of contamination in the Whittier Narrows area. Table 1 shows the maximum concentrations found in SWS's wells in the Bartolo well field, along with EPA MCLs and DHS action levels for the contaminants detected. As of this date, only one contaminant has been detected at levels above EPA's MCLs or DHS action levels: Well 201W4 (Recordation No. 01901433) has recently showed TCE concentrations above the MCL of 5 ppb (6.3 ppb). The concentration of contaminants in SWS's wells has been increasing over the last two years. Figures 6 and 7 show the increasing trend of historic TCE and PCE concentrations for Wells 201W2 and 201W4. The trend for the other two SWS wells is more equivocal, showing no clear increasing trend. Simple analytical modeling of the zone of capture of the Bartolo wells was completed and showed that Well 201W4 may be pulling much of its water from the contaminated area to the east.

Limited testing of production wells has also been conducted to determine the vertical extent of contamination in the vicinity of the Bartolo well field. The special testing was completed for one of SWS's wells (201W4) and the nearest well upgradient to the Bartolo wells, San Gabriel Valley Water Company Well B2. The testing procedure, referred to as "well logging and depth specific sampling," utilizes existing production wells with multiple perforated intervals to determine the quantity of water produced from each interval, and the depth-specific water quality. The results of this testing are shown, along with a representation of the local geologic conditions based on available well logs, in Figure 8. The limited data shows that the most contaminated water may occur within the zones of intermediate depth (200-350 feet). The shallower zones are contaminated at lower levels, and the deepest zones are even less contaminated. This suggests that sources of contamination far upgradient of the Bartolo well field may contribute a significant portion of the groundwater contamination found in this area, since if local sources were the primary source of contamination,

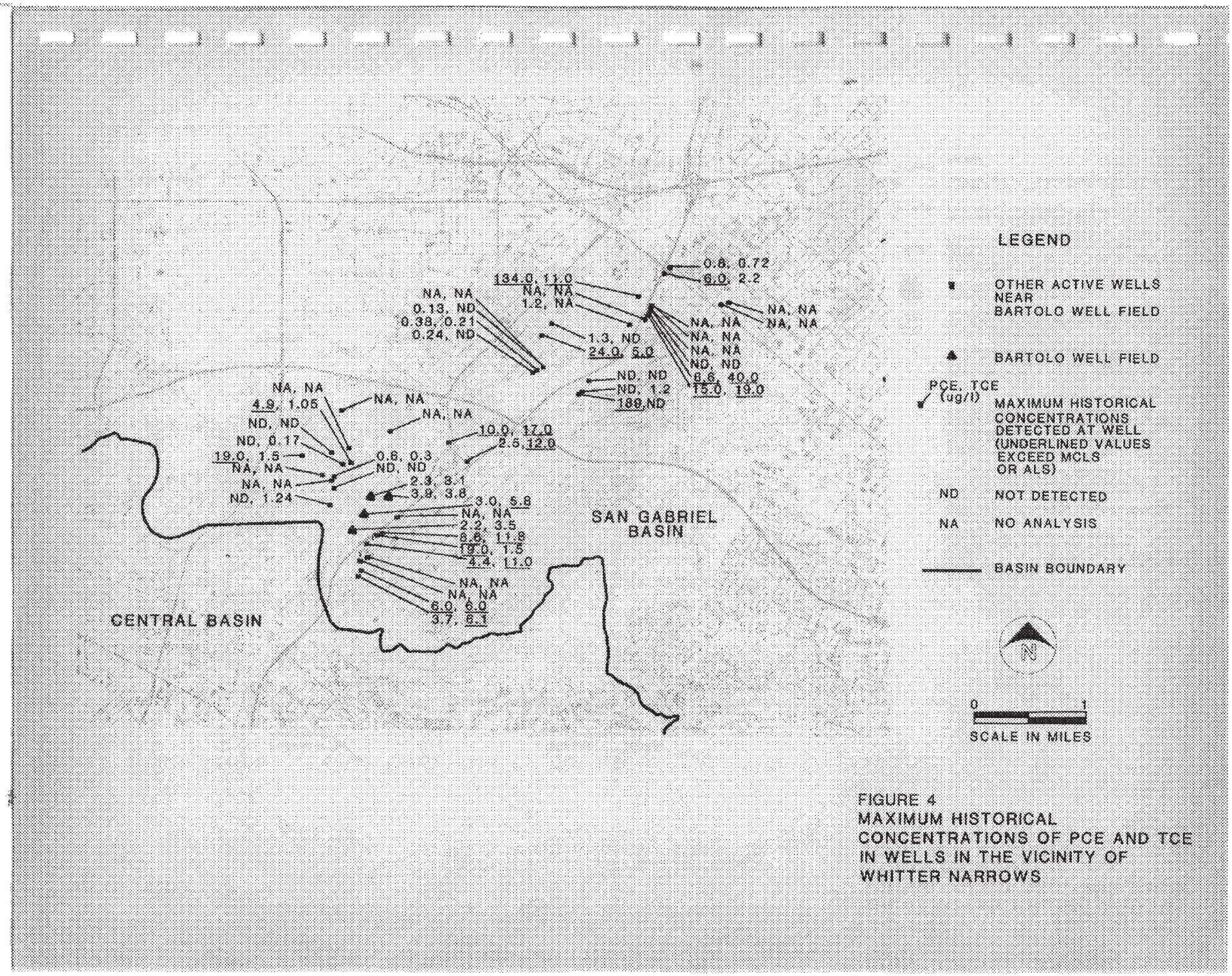


FIGURE 4
MAXIMUM HISTORICAL CONCENTRATIONS OF PCE AND TCE IN WELLS IN THE VICINITY OF WHITTER NARROWS

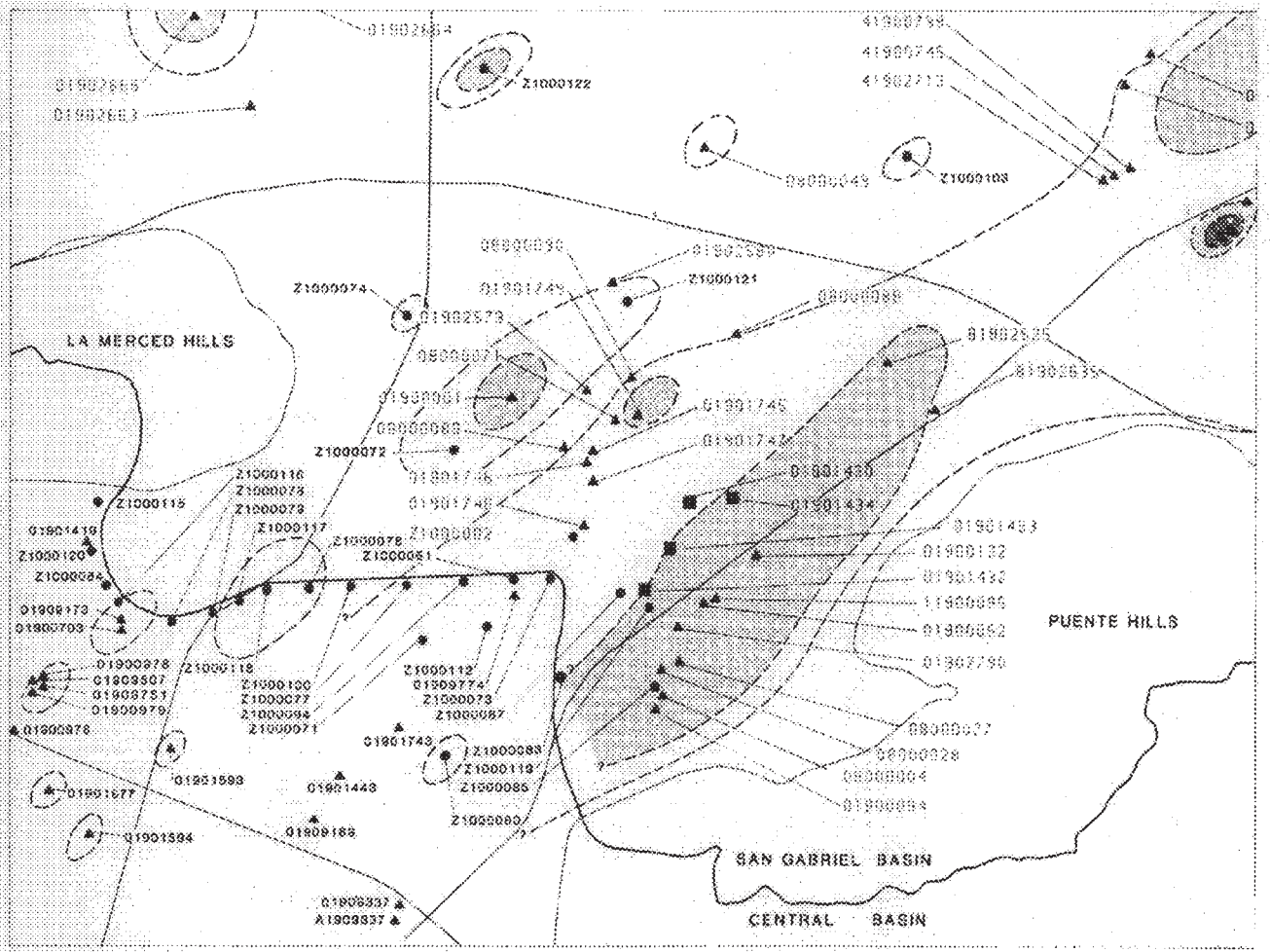


FIGURE 5
APPROXIMATED AREAS WITH
TCE AND/OR PCE CONTAMINATION IN
THE VICINITY OF WHITTIER NARROWS

TABLE 1

MAXIMUM CONCENTRATIONS OF ORGANIC CONTAMINANTS FOUND IN SUBURBAN WATER SYSTEMS BARTOLO WELL FIELD*

Chemical	Maximum Historical Concentration (ug/l)	Number of Samples Analyzed	Number of Detections
1,1,1-Trichloroethane	1.0	61	11
1,1-Dichloroethane	0.4	57	3
1,1-Dichloroethylene	1.8	132	92
1,2-Dichloroethane	0.1[c]	63	4
cis-1,2-Dichloroethylene	4.2	14	8
Carbon Tetrachloride (CTC)	0.1[c]	72	3
Dibromochloromethane[a] (THM)	0.6	55	1
Methylene Chloride	1.0	59	5
Tetrachloroethylene (PCE)	3.9[c]	115	94
Pentane[a]	3.0[b]	1	1
trans-1,2-Dichloroethylene	3.5[b]	59	8
Trichloroethylene (TCE)	5.8[c]	136	121

* Concentration ranges and numbers of detections represent data collected by EPA, DHS, Suburban Water Systems, and the Upper San Gabriel Valley Municipal Water District (AB 1803 Program monitoring) from January 1980 through April 1, 1988.

[a] Compound has been detected in only one sample.

[b] The reported concentration was estimated.

[c] Excluding anomalous sample results reported by Thermo Analytical.

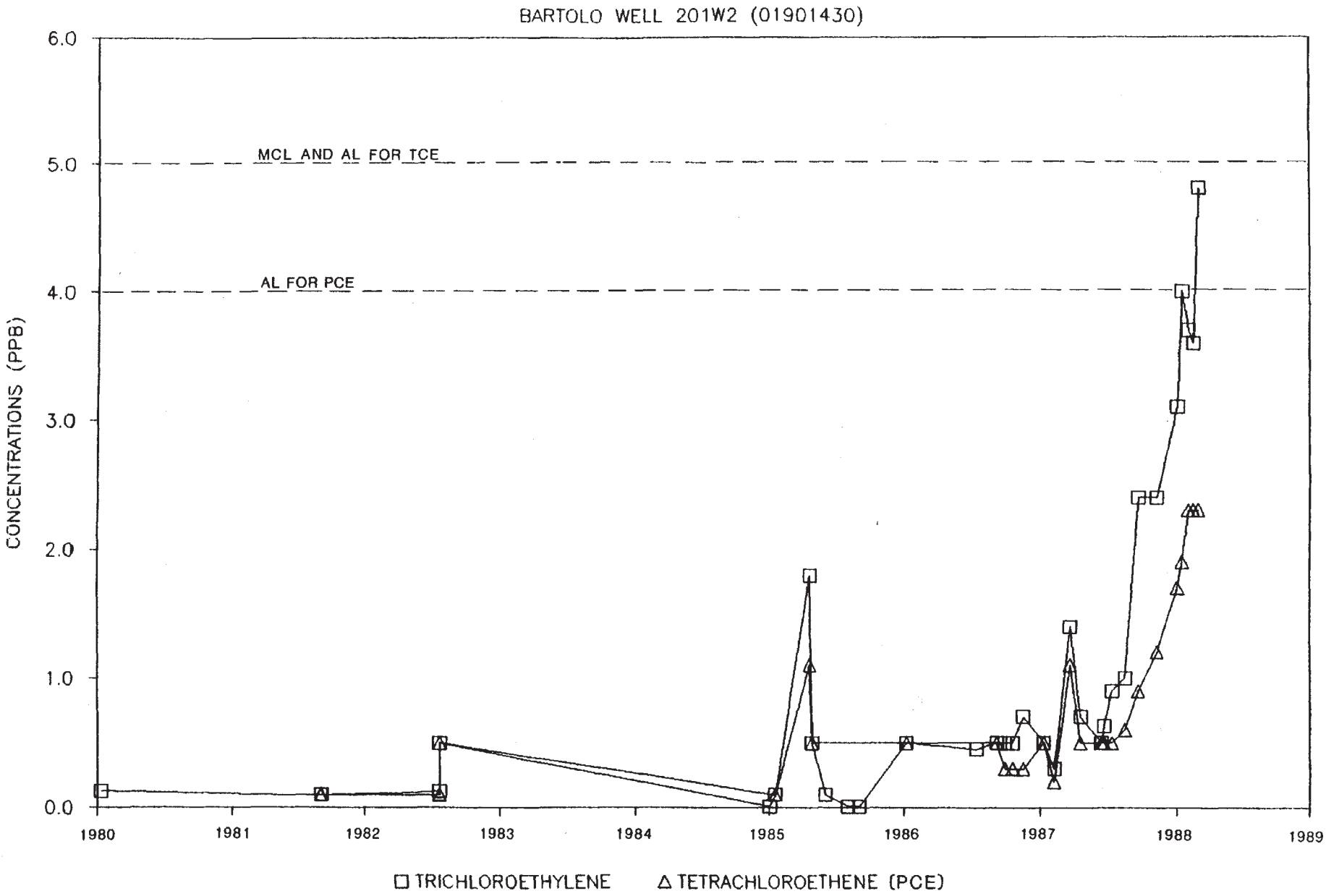


FIGURE 6
HISTORIC TCE AND PCE CONCENTRATIONS IN BARTOLO WELL 201W2 (1901430)

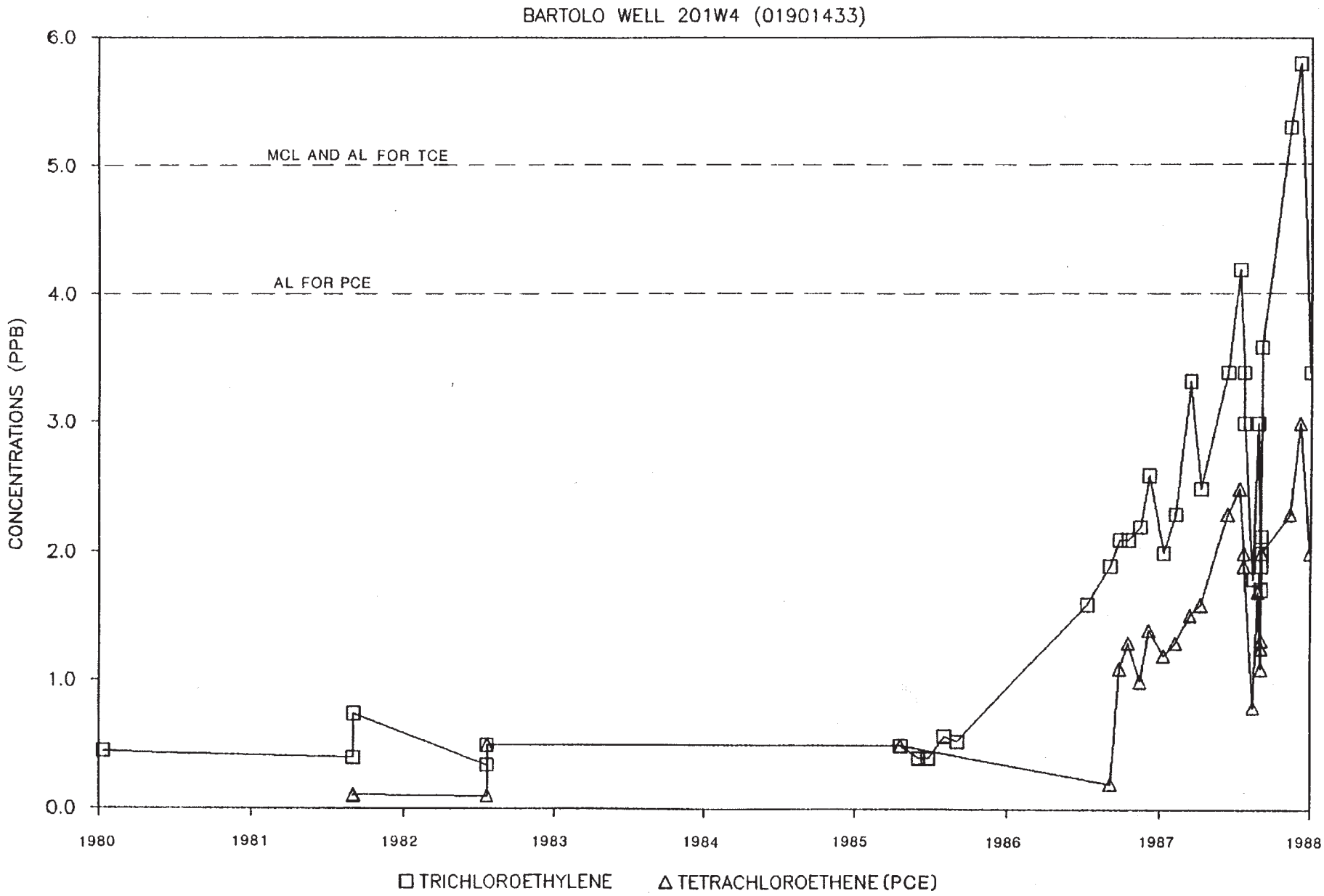


FIGURE 7
HISTORIC TCE AND PCE CONCENTRATIONS IN BARTOLO WELL 201W4(1901433)

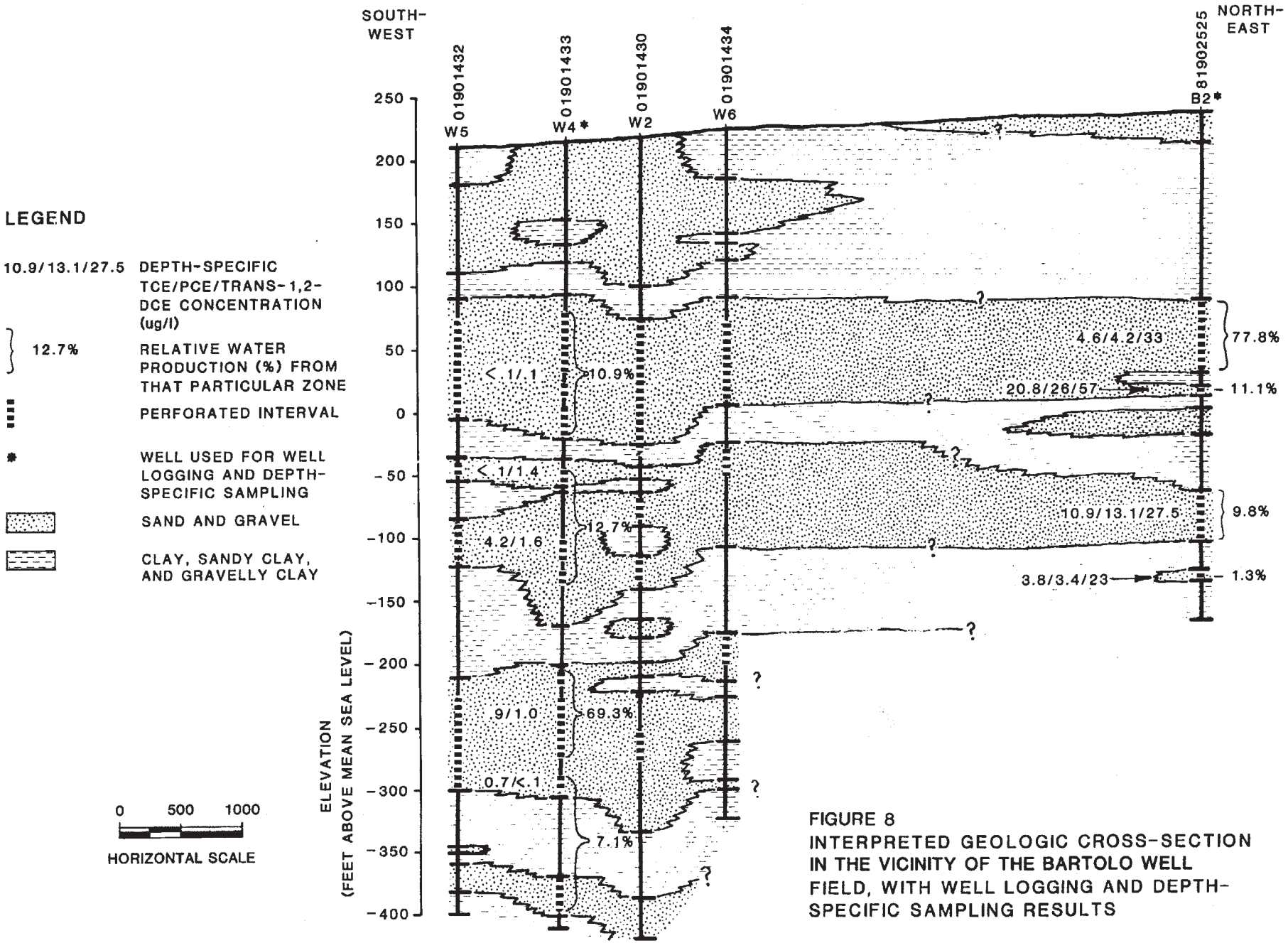


FIGURE 8
INTERPRETED GEOLOGIC CROSS-SECTION IN THE VICINITY OF THE BARTOLO WELL FIELD, WITH WELL LOGGING AND DEPTH-SPECIFIC SAMPLING RESULTS

the shallower zones would be expected to have the highest contamination concentrations.

7.0 BASELINE SITE RISKS

To determine the baseline site risk posed by contamination at the Bartolo Well Field, estimates were made of the future water quality at the wellhead of the SWS wells. The estimates of future wellhead water quality were based on the mean and maximum historical wellhead concentrations observed in production wells located upgradient of the Bartolo Well Field. Regional groundwater flow velocities were used to determine travel times from upgradient wells to the Bartolo Well Field. For the purposes of estimating future water quality for the baseline site risk assessment, wells were grouped in approximate 5-year intervals based on the estimated travel time. The mean and maximum historical concentrations of all wells within a 5-year travel time of the Bartolo Well Field were used as the estimate of the concentration of the Bartolo wells over this 5-year period. For the short-term (0-5 years), wellhead concentrations of the two primary contaminants, TCE and PCE, are estimated to continue to rise and reach a maximum of 17 and 18.5 ppb, respectively. This is based on the historical contaminant concentrations that have been detected in the nearest upgradient well, San Gabriel Valley Water Company Well B2.

This method for estimating future water quality suffers (as would any other method) from the limited detailed data available regarding water quality and local groundwater flow velocities. For example, there are no wells within the 5-20 year travel time interval. Therefore, data from the 4 wells found within the 20-25 year travel time interval were used to represent the entire 5-25 year travel time interval.

The future concentration estimates extended out 60 years. Although 70 years is normally used for a cancer risk assessment, there are no upgradient wells with travel times between 60 and 70 years. Using the estimates of future water quality at the Bartolo Well Field, the no action risk baseline for cancer risks was calculated in the Public Health Evaluation to be approximately $6\text{-}8 \times 10^{-6}$, or just under 10^{-5}. This number represents the risk of contracting cancer due to exposure to contaminated groundwater from the Bartolo Well Field. While SWS by law cannot serve water that exceeds MCLs, the public health evaluation hypothetically removes this institutional control and assumes exposure to the contaminated groundwater via SWS's water supply system.

Although more than 20 organic chemical contaminants have been detected in SWS's Bartolo well field or in upgradient wells in the Whittier Narrows area, many of these did not enter into the calculation of the baseline site cancer risk. Only TCE, PCE, carbon tetrachloride, chloroform, 1,1 -dichloroethylene, 1,2-dichloroethane, methylene chloride, and 1,1,2,2-tetrachloroethane are considered potential carcinogens in water. In addition, because of equivocal evidence of carcinogenicity, 1,1-dichloroethylene and 1,1,2,2-tetrachloethane were not considered a carcinogen in the Public Health Evaluation calculations for this site.

At sufficiently high exposure levels, the noncarcinogens, along with some of the carcinogens, have chronic (noncarcinogenic) or subchronic (short-term) health effects associated with them. The contaminant concentrations currently found or estimated to be found in the future in the Bartolo Well Field are all below levels believed to have the potential to cause noncarcinogenic health effects.

The primary exposure pathway is ingestion of groundwater. Other exposure pathways of concern for contaminated groundwater used for domestic purposes include absorption through the skin (dermal exposure route) and inhalation of volatilized chemicals, which could occur during showering, cooking, or other water uses in the home. These exposures would tend to increase the baseline risk from ingestion. While there is no scientific consensus on the significance of these pathways, some current literature suggests that these pathways may be equal to or greater than the exposure due to ingestion. The risk from these pathways, however, are not currently quantifiable.

8.0 CHANGES TO THE PROPOSED PLAN

This decision document selects the response action described in the proposed plan. The only change that has been made is in the determination of applicable or relevant and appropriate requirements (ARAR) that would apply to the proposed action, however, this does not change the selection of remedy. Some uncertain aspects of the response action that were included in the proposed plan are clarified in this section.

In the proposed plan, South Coast Air Quality Management District (SCAQMD) Rule 1167 is identified as an ARAR. This ARAR is presented as the rationale behind including activated carbon adsorption treatment of the air stripper off-gas for control of

air emissions. A recent court ruling has stayed enforcement of this rule, so it is not legally considered an ARAR at this time, but instead as a "to be considered" requirement (see ARARs--§ 10.0 on page 18). In this decision document, the remedy selected still incorporates the air emissions control despite the fact that SCAQMD Rule 1167 is not considered an ARAR.

The rationale behind this is that SCAQMD fully intends to pursue the procedural steps needed to establish Rule 1167 as a legally enforceable promulgated regulation in the near future. In addition, the South Coast Air Basin is considered nonattainment for ozone under the Clean Air Act. As the intent of Rule 1167 was to control the VOC precursor emissions to ozone, it is reasonable to include air emissions control as part of this response action to assist SCAQMD's efforts to reach attainment status in the South Coast Basin. Finally, public comment submitted to EPA in writing and made by attendees at the public meeting was overwhelmingly in support of including air emissions controls regardless of the legal status of SCAQMD Rule 1167.

The proposed plan included incorporation of well modifications to selectively extract groundwater from the most contaminated zones in the aquifer. This recommendation was based on the limited data available that showed well modification may be feasible. The actual extent of incorporating well modification in the response action depends on whether additional data collected during the design phase supports its feasibility.

During the design phase, well logging and depth-specific sampling of wells in the Bartolo Well Field will be conducted, and one or more groundwater monitoring well clusters may be installed nearby and sampled to better determine the vertical distribution of contamination. Based on the data obtained through this testing, a determination of the feasibility of well modification will be made. If well modification is determined to be feasible, the actual modifications to SWS's wells will be designed. In addition, the need or desirability of drilling new extraction well(s) to extract the most highly contaminated groundwater will be subsequently determined and new wells designed if so indicated.

The proposed plan also described how, at a minimum, EPA will incorporate floodproofing features into the design of the treatment system at the Bartolo Well Field. During the design phase, alternative floodproofing options will be identified. The actual floodproofing measures incorporated into the design will be selected at that time based on their potential to reduce flood damage and their cost-effectiveness.

9.0 DESCRIPTION OF ALTERNATIVES

As described in the Decision Scope section (page 8), EPA established two primary remedial response objectives for the SWS Bartolo Well Field response action:

- to control migration of contaminants from the San Gabriel Basin through Whittier Narrows into the Central Basin, thereby contributing to aquifer restoration at the San Gabriel Valley Areas 1, 2, and 4 sites; and

- to address the potential public health threat posed by contamination of SWS's Bartolo Well Field by providing residents in SWS's Whittier District with a water supply meeting federal and state drinking water standards.

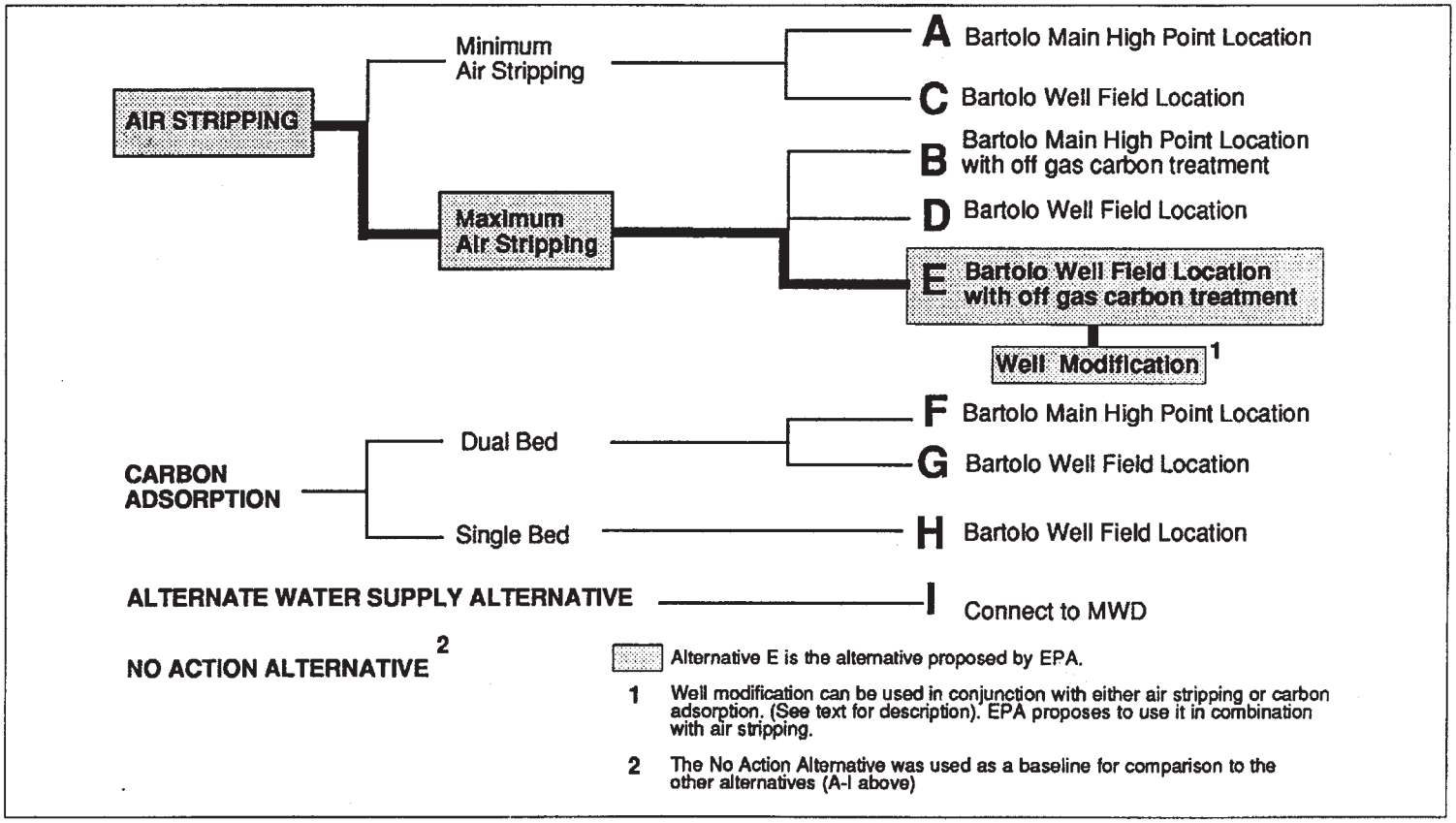
General response actions that may be applicable to groundwater contamination were screened based on two criteria--the ability to meet the remedial response objectives and the applicability of the technology to the site conditions. Several technologies were dismissed from further consideration based on these criteria. For instance, containment options involving vertical barriers such as slurry walls were dismissed because they are physically limited to about 200 feet in depth and groundwater contamination has been detected to greater depths in the Whittier Narrows area. Similarly, in situ treatment was not evaluated further since the technology has not advanced to the state where it could be reliably used in an aquifer such as the San Gabriel Basin where the horizontal and vertical extent of contamination is so large.

For response actions involving extraction and treatment of contaminated groundwater, options for disposal of treated groundwater that did not involve discharge to SWS's water supply distribution system were eliminated from further consideration. The reason for this is that direct discharge of treated water to SWS's water supply system is the only way that the second response objective can be met without supplying an alternative water supply in addition to the groundwater response action at a substantial additional cost.

Figure 9 shows the alternatives developed and evaluated in the OUFS. One alternative (Alternative I) was developed--alternative water supply--that would only meet one of the remedial response objectives. This alternative would involve replacing the water supply currently obtained from the Bartolo Well Field with water purchased from the Metropolitan Water

Figure 9

ALTERNATIVES FOR REMEDIAL ACTION AT THE BARTOLO WELL FIELD



District of Southern California (MWD) and conveyed through a new pipeline. This alternative would meet the objective of supplying SWS's customers with water that meets federal and state drinking water quality standards. However, it would not meet the objective of controlling the migration of contaminants through the Whittier Narrows area. Under this alternative, response action to meet the second objective would be deferred to the future Whittier Narrows operable unit.

All of the other remedial alternatives considered (except the no action alternative) involve extraction of groundwater from the Bartolo Well Field (to meet the first remedial response objective), treatment of the contaminated water, and use of the treated water as water supply for SWS's customers (to meet the second remedial response objective). The alternatives differed in their choice of treatment technology, level of treatment, treatment technology configuration, and location of the treatment system.

Two treatment technologies, identified by EPA's Drinking Water Office as the Best Available Technologies for treatment of VOCs in drinking water applications, were evaluated in detail:

- Packed tower air stripping treatment (Alternatives A-E); and
- Liquid phase granular activated carbon adsorption (GAC) treatment (Alternatives F-H).

All of the treatment system alternatives were developed to treat contaminated water at a rate of 10,000 gallons per minute, at about the nominal production capacity of the wells in the Bartolo Well Field. In addition, all of the treatment system alternatives are assumed to operate over the expected design life of the installed equipment (30 years). Whether the treatment facilities would need to operate longer than 30 years depends on the selected remedy for the Whittier Narrows Operable Unit and other operable units at the San Gabriel Valley Areas 1, 2, and 4 sites.

Several alternative air stripping alternatives were developed by using different combinations of three components--level of treatment, control of emissions, and location. Two different levels of treatment were evaluated. The alternative termed "minimum air stripping" would treat the contaminated water to a level where the contaminant concentrations would meet EPA MCLs and DHS action levels (Alternatives A & C). The "maximum air stripping" alternative

would treat to levels below MCLs and action levels at which the cumulative residual public health risk would be at or below the 10^{-6} level (Alternatives B, D, & E). Air stripping alternatives were developed that did not incorporate any air emissions controls (Alternatives A, C, & D), as well as alternatives that did include gas phase GAC treatment of off-gas emissions (Alternatives B & E). The alternatives with air emissions controls would reduce expected VOC emission levels by an estimated 90%. Air stripping alternatives were also developed for two alternative treatment system locations. One location was on SWS property at the Bartolo Well Field (Alternatives C-E). Since this location is in the 100-year floodplain of the San Gabriel River, an alternative site (termed the Bartolo Main high point location) for the treatment system was considered that is about one and one-half miles to the south along the transmission main that carries water from the Bartolo Well Field to SWS's Whittier Service District (Alternatives A & B).

Two configurations of carbon adsorption systems were evaluated for consideration. Under one configuration (single bed), water would flow through a single carbon vessel before entering the treatment system (Alternative H), while under the other configuration (dual bed), the water would flow through two carbon vessels in a series combination (Alternatives F & G). The dual bed configuration has a higher capital cost, but provides an extra level of protection since if contamination "breaks through" the first carbon bed there is still a second carbon bed to provide treatment of the contaminated water. In addition to the alternative treatment system configurations, carbon adsorption alternatives were also developed for the two different locations for the treatment system described above (Alternatives F & G at the Bartolo Well Field site and Alternative H at the Bartolo Main high point site).

An additional extraction alternative was developed as an option that could be combined with any of the treatment system alternatives--well modification. Based on the limited well logging and depth-specific sampling that was conducted (see § 6.0, pp. 10), it appears that the contamination is more prevalent in specific zones of the aquifer at the Bartolo Well Field. Under the well modification alternative, the existing Bartolo wells would be modified and/or new production wells would be installed to selectively extract water from the depths where the most contamination is found. In this way, the amount of groundwater contamination removed from the aquifer by the response action will be maximized, which will assist in the control of migration of contaminants in the Bartolo Well Field area. Figures 10 and 11 show conceptually how well modification

Figure 10

WELL PUMPING WITHOUT WELL MODIFICATION

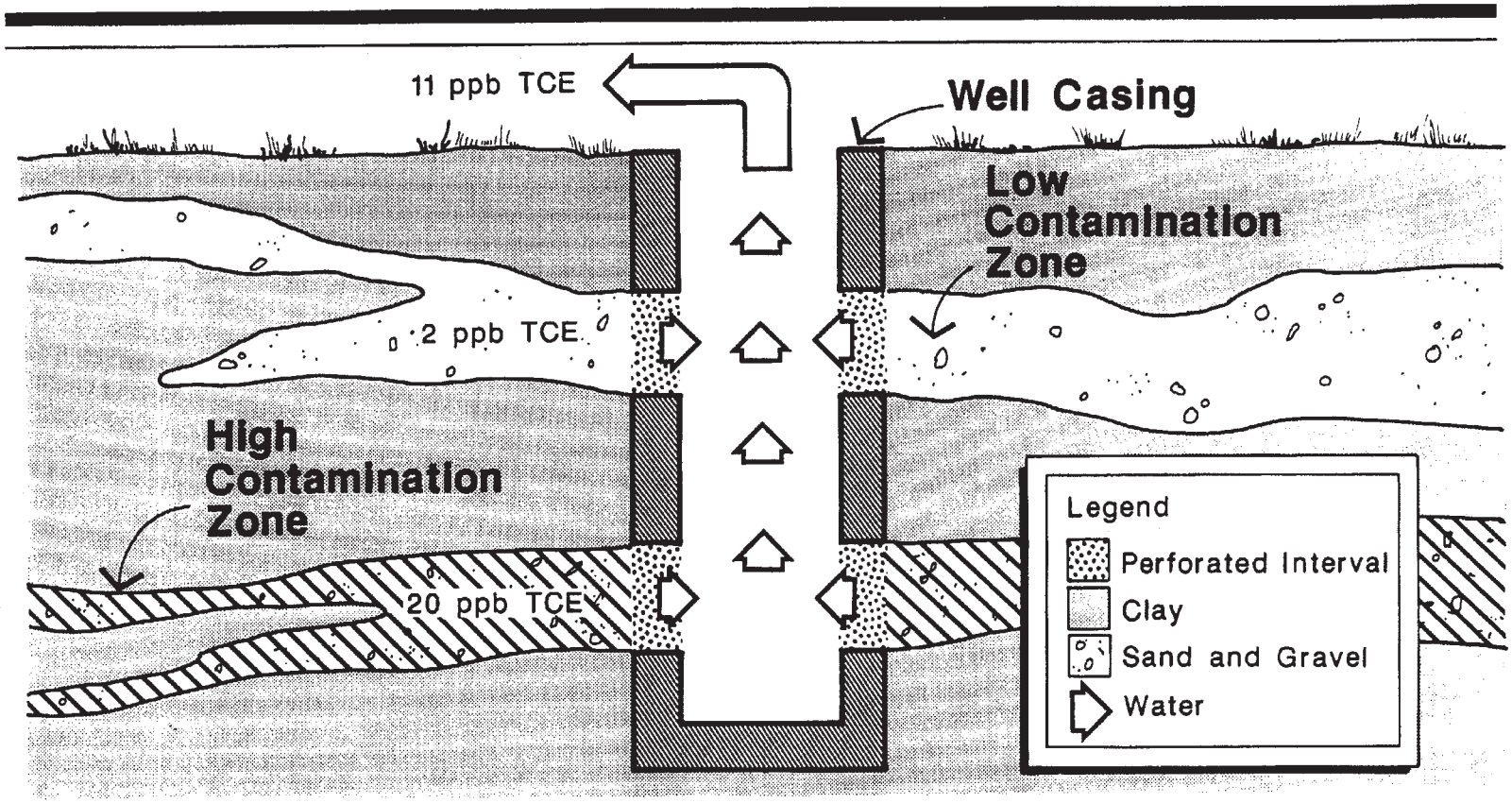
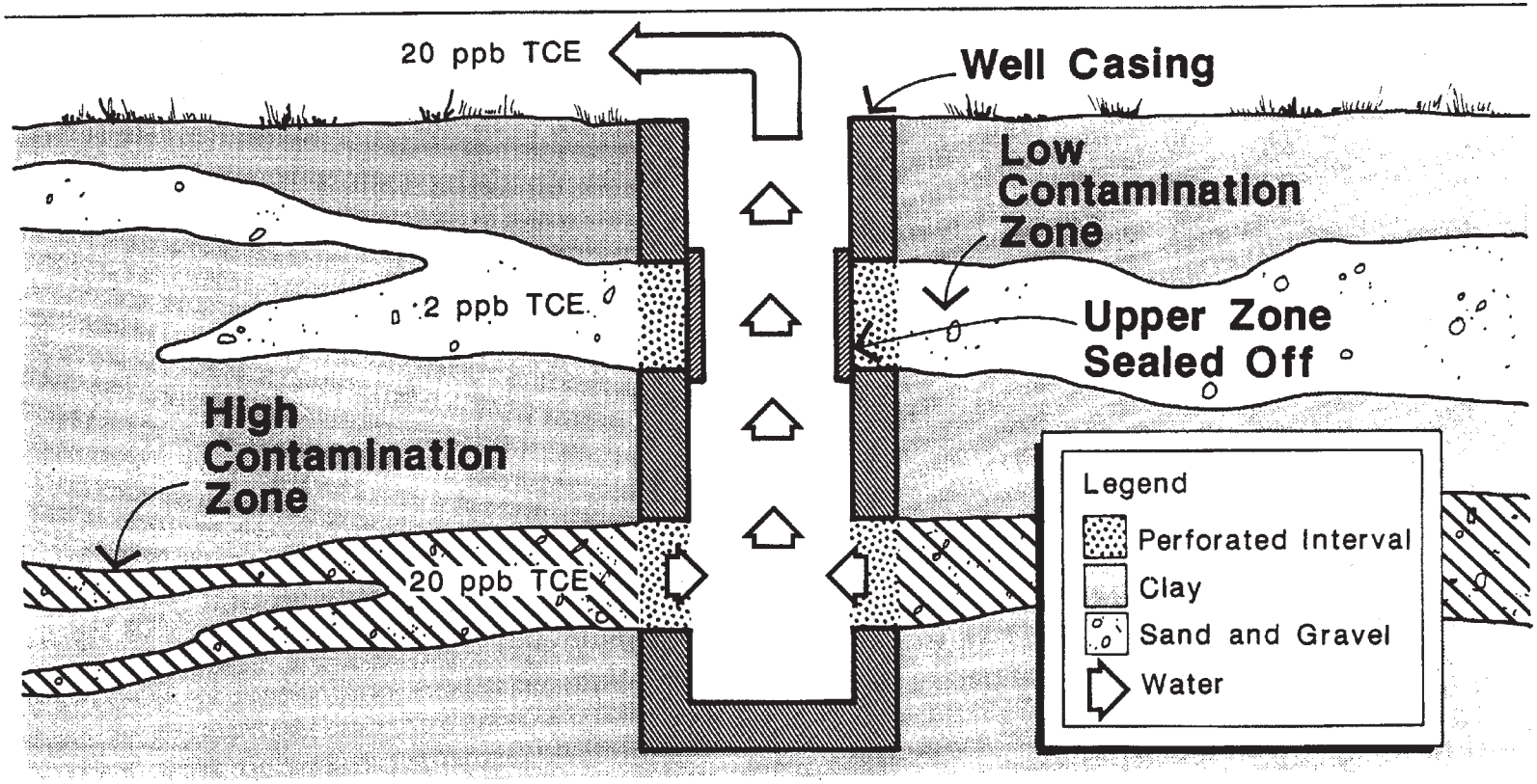


Figure 11

WELL PUMPING WITH WELL MODIFICATION



could increase the removal of groundwater contamination from the aquifer.

Further testing during the design phase will have to be conducted to determine what, if any, well modifications are feasible. For the purposes of estimating the cost of this alternative, it was assumed that the four existing wells are modified so that only water from the upper two zones are extracted and one new production well is installed to make up for the lost production capacity.

Estimates have been made of the maximum potential depth-specific contaminant concentrations, based on the results of the depth-specific sampling conducted at San Gabriel Valley Water Company Well B2, located upgradient of the Bartolo Well Field. The estimates were obtained by multiplying the maximum historical wellhead concentrations found in Well B2 by the ratio between the maximum depth-specific concentration and the wellhead concentration found during the depth-specific sampling of Well B2. Since selective extraction of contaminated water may be implemented with any treatment system alternative, the estimated maximum potential depth-specific contaminant concentrations were used in estimating influent concentrations for the treatment system alternatives' conceptual designs.

Estimated total present worth costs for the treatment system alternatives that were developed in detail range from about 6.6 to 26.1 million dollars. The estimated cost of the well modification option (which would be in addition to the cost of any of the treatment system alternatives) is about $2.6 million. The alternative water supply alternative alone would have an estimated total cost of $42.1 million. Table 2 gives a summary of the capital and operations and maintenance costs for the alternatives.

10.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

Applicable or relevant and appropriate requirements (ARARs) can be grouped into three categories: chemical-specific ARARs; action-specific ARARs; and location-specific ARARs. The chemical-specific ARARs that apply to this response action are the Safe Drinking Water Act MCLs. California DHS has set action levels for VOCs, a few of which are more stringent than the MCLs or for which no MCL has been established. While the DHS action levels are not promulgated standards and are not, therefore, ARARs, they have been taken into consideration during development of remedial action alternatives. In addition, DHS has recently

Table 2

COST COMPARISON OF ASSEMBLED ALTERNATIVES
($1,000's)

Alternative	Short-Term Capital Cost	Incremental Long-Term O&M Cost	Net Present Worth at Discount Rate		
			3 Percent	5 Percent	10 Percent
A: Minimum Air Stripping at Bartolo Main High Point	1,640	324	7,991	6,621	4,694
B: Maximum Air Stripping at Bartolo Main High Point with Off-gas Carbon Treatment	4,342	707	18,198	15,209	11,006
C: Minimum Air Stripping at Bartolo Well Field	1,739	326	8,129	6,750	4,812
D: Maximum Air Stripping at Well Field	2,363	393	10,056	8,397	6,063
E: Maximum Air Stripping at Bartolo Well Field with Off-Gas Carbon Treatment	4,387	708	18,258	15,266	11,058
F: Dual Bed Carbon Adsorption at Bartolo Main High Point	10,693	1,003	30,358	26,116	20,151
G: Dual Bed Carbon Adsorption at Bartolo Well Field	10,221	994	29,700	25,498	19,589
H: Single Bed Carbon Adsorption at Bartolo Well Field	7,433	1,052	28,059	23,609	17,353
I: Replace Bartolo Well Field Supply with Water from MWD	6,388	2,326	51,973	42,140	28,312
Additional Option for All Treatment Alternatives:					
Well Modification	1,042	101	3,022	2,595	1,994

proposed MCLs for a number of VOCs. Of particular significance, the proposed MCL for PCE is 2 ppb, which is lower than the current DHS action level of 4 ppb. Although the proposed MCLs are not yet promulgated, they have been taken into consideration during the remedy selection process. Table 3 lists the MCLs and DHS action levels for the primary contaminants from the Public Health Evaluation.

Table 3 also lists the Maximum Contaminant Level Goals (MCLGs) for the primary contaminants. MCLGs, which are based only upon health criteria, are not directly applicable as chemical-specific requirements because they are not enforceable standards. In accordance with the EPA "Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements (OSWER Directive 9234.0-05)," the MCLs are considered the chemical-specific ARARs because they are (1) the enforceable drinking water standards, (2) required to be set as close to the MCLGs as is feasible, taking into consideration the best technology, treatment techniques and other factors (including cost), and (3) protective of public health to within EPA's acceptable carcinogen risk range of 10^{-4} to 10^{-7}.

The primary action-specific requirement affecting this response action is the South Coast Air Quality Management District's (SCAQMD) Rule 1167. The purpose of Rule 1167 was to control VOCs as precursor emissions to ozone formation in the South Coast Air Basin. The South Coast Air Basin is currently in nonattainment status with respect to the National Ambient Air Quality Standards (NAAQS) for ozone. In California, authority to regulate stationary sources of emissions has been delegated to local air quality management districts. Therefore, this rule, having been duly promulgated by SCAQMD in early 1988, constituted a promulgated state requirement under a state environmental law--as set forth in section 121(d) of the Superfund Amendments and Reauthorization Act of 1986 (SARA)--that is generally applicable.

This rule requires that all air stripping facilities treating contaminated groundwater that emit more than one pound per day of total VOC emissions install air emission controls capable of reducing air emissions by 90%. At the current contaminant levels found in the Bartolo wells, an air stripping facility would be expected to emit just below one pound per day of total VOCs; however, with the projected future wellhead and depth-specific contaminant concentrations that are expected to be extracted from the Bartolo Well Field for treatment in the near future, the air emissions will exceed the one pound per day limit.

TABLE 3

MCLs, MCLGs & STATE ACTION LEVELS FOR PRIMARY ORGANIC CONTAMINANTS DETECTED IN THE WHITTIER NARROWS AREA
(μg/l)

CHEMICAL	MCL OR PROPOSED MCL	MCLG OR PROPOSED MCLG	STATE ACTION LEVEL*
trichloroethylene (TCE)	5	zero	5
tetrachloroethylene (PCE)	---	---	4[a]
1,1-dichloroethylene	7	7	6
trans-1,2-dichloroethylene	---	70	16[b]
cis-1,2-dichloroethylene	---	70	16[b]
carbon tetrachloride (CTC)	5	zero	5[a]

*State Action Levels are set by the California Department of Health Services.

[a] DHS has recently proposed establishing State MCLs for PCE and CTC of 2 and 0.5 ppb, respectively.

[b] Action level is for each 1,2-dichloroethylene isomer individual concentration or the some of the concentrations of both isomers.

Rule 1167 was considered an ARAR in the proposed plan since the rule was promulgated on January 8, 1988 and scheduled to take effect before installation of a treatment system at the Bartolo Well Field. Therefore, the proposed plan included the installation of air emission controls (off-gas vapor phase GAC treatment) to comply with SCAQMD Rule 1167. Subsequent to the release of the proposed plan, a state court ruled on a lawsuit filed by the Upper San Gabriel Valley Municipal Water District challenging the adoption of Rule 1167 without preparation of an Environmental Impact Report (EIR) as required under the California Environmental Quality Act (CEQA). The court's decision ordered SCAQMD to rescind its adoption of the rule and refrain from re-adopting a rule governing emissions from air stripping equipment pending completion by SCAQMD of an EIR focused on the potential impact of the rule on groundwater supplies, groundwater quality, and imported water supplies in the SCAQMD area. Since the rule is no longer generally applicable to existing or proposed air stripping systems operated by private parties within the South Coast Basin, it is not legally an ARAR. It has been taken into consideration during the remedy selection process, however, since SCAQMD has indicated that it fully intends to proceed to adopt Rule 1167 as a promulgated requirement.

Several of the alternatives developed included construction of treatment systems at the Bartolo Well Field. The Bartolo Well Field is located within the flood retention basin of the Whittier Narrows Dam. The proposed treatment system location is located within the 100-year floodplain of the San Gabriel River. Two location-specific ARARs apply to actions that would take place within the floodplain. First, the Floodplain Management Executive Order (E.O. 11988), directs EPA to avoid actions located within or affecting the 100-year floodplain unless the floodplain location is the **only practicable alternative.** In addition, in the absence of a practicable alternative, actions must be designed or modified in order to minimize potential harm to or within the floodplain. Second, EPA drinking water regulations adopted under the authority of the Safe Drinking Water Act (40 CFR, 141.5) require that the construction or modification of public water supply systems, **to the extent practicable**, should not be located within the 100-year floodplain. To determine compliance of potential alternatives with these ARARs and to comply with the EPA implementing regulations for E.O. 11988 (40 CFR Part 6, Appendix A, Statement of Procedures on Floodplain Management and Wetland Protection), a floodplain assessment was prepared as part of the OUFS. The next section describes the findings of the floodplain assessment.

11.0 FLOODPLAIN ASSESSMENT

The floodplain assessment, prepared as part of the OUFS, included the following components: whether the action would be located within or affect the 100-year floodplain; the identification of alternatives to carrying out the action within the floodplain; the impact of the action on the floodplain; the identification of measures to minimize potential harm to the action if the action must be carried out in the floodplain; and the implications of loss of use of the treatment facility during and after a flood event.

Five of the treatment system alternatives developed in the OUFS include the construction of treatment alternatives at the Bartolo Well Field site, which is located on 90 acres of land owned by SWS inside the Whittier Narrows Dam impoundment area. The proposed treatment facilities would be located at an elevation approximately 13 feet below the 100-year flood elevation, corresponding to the 30-year flood elevation that has the probability of being flooded once every 30 years. Since the design life of the treatment facilities is 30 years, at least one flood event would be expected during the facilities' lifetime. The highest probability of flooding would occur during the winter storm season, which typically lasts from November through April. The 30 year flood elevation is subject to frequent flooding, sedimentation, and wave action. The warning for a 100-year flood could be as little as 12 hours; for a 30-year flood, the warning would be less.

An alternative location for the treatment system outside of the floodplain was identified and retained for detailed evaluation in the OUFS. This alternative site is located at the high point of the Bartolo Transmission Main, which carries water from the Bartolo Well Field to the Whittier Service District to the south. The site is near the intersection of Workman Mill Road and Strong Avenue (Figure 12). Though a specific property has not been identified, several acres of vacant property are adjacent to the high point location.

The primary advantage of the alternative high point site is that it is not within the 100-year floodplain. In addition, construction and operation of the treatment system is slightly less costly at the high point site since the treated water can return to the Bartolo Transmission Main by gravity without repumping. This cost difference is less than 0.4 percent, however, for the treatment system configuration included in the proposed plan.

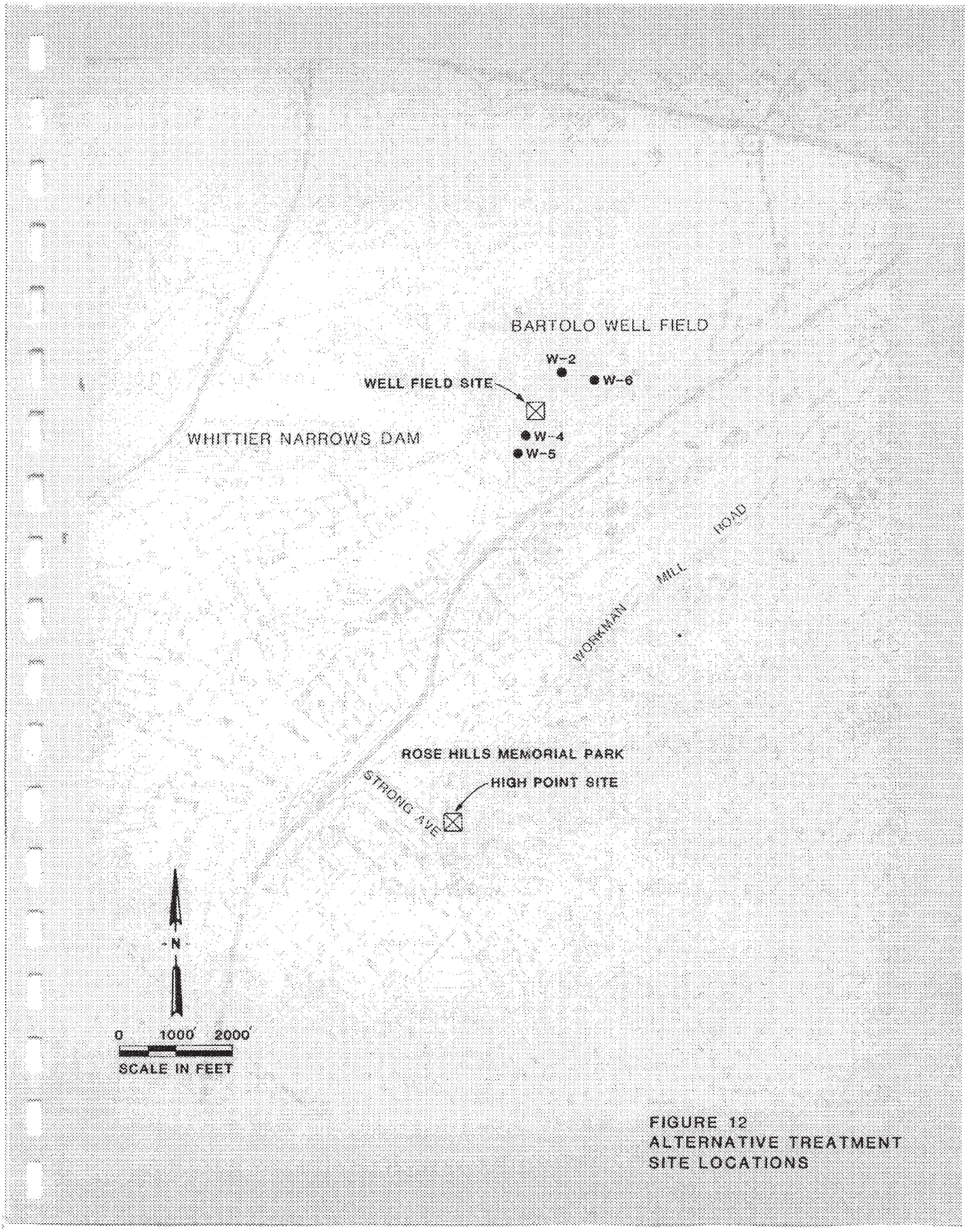


FIGURE 12
ALTERNATIVE TREATMENT
SITE LOCATIONS

The high point location has two serious disadvantages. First, the high point site is located adjacent to residential areas. Due to the potential visual, noise, and air quality impacts, the acceptability of this location to the community is questionable (see § 12.0, page 25 for a discussion of public comment regarding this issue). Second, property at the high point location would have to be identified and acquired. This would require additional time and expense to complete the design and construction of the action. To get an estimate of the potential delay to construction, DHS was contacted regarding how quickly they would be able to acquire property at the high point location. [Note: Under EPA CERCLA policies, the state is required to obtain site access for EPA response actions.] DHS responded that they would obtain property either through purchase of easements through negotiation or through eminent domain. Either course of action would add a delay of at least one year to the project because an Environmental Impact Report would be required under CEQA before DHS could take action to obtain property. If negotiations proved unsuccessful, the use of eminent domain could result in substantial delays (2-5 years) due to the mandatory notice and appeal process, as well as potential lawsuits.

The Bartolo Transmission Main high point site is not considered a practicable alternative due to the long delay in implementation that would be incurred to allow for locating and acquiring property for the treatment facility, and due to its vicinity to adjacent residential areas and the lack of public acceptance within the local community.

For the Bartolo Well Field location, the primary disadvantage is its location in the floodplain and the possibility of damage or loss of equipment or interruption of operation of the system during and after a flood event. In addition, as discussed above, the treatment system cost is slightly higher due to the need for a booster pump station to return the treated flow to the Bartolo Transmission Main. The two primary advantages of the well field location are its ownership by SWS, which allows for expedited construction, and its location remote from any residential areas.

A treatment facility can be constructed in such a manner at the Bartolo Well Field that it will not have any effect on the floodplain. The treatment system can be designed to withstand wave action in the dam impoundment area. In addition, construction techniques can be used to secure or remove equipment to prevent it from being carried away and becoming lodged in the dam spillway and blocking the downstream flow of floodwater. The

facility would be constructed so that there is no change in the storage volume of the impoundment. Therefore, the facility will have no effect on floodplain boundaries.

Numerous floodproofing techniques are available to minimize damage to the facility during flooding if the treatment system is located at the Bartolo Well Field site. The maximum flood protection would be achieved by elevating the facility above the 100-year flood elevation on earth fill or piles. This would add substantial capital cost to the project and require additional time for design and construction. In addition, if earth fill was used, Army Corps of Engineers requirements specify that an equivalent amount of fill has to be removed from the same or lower elevation within the dam impoundment (so the impoundment storage volume stays the same). Removal of this amount of fill may impact adjacent wetland areas.

Several partial floodproofing techniques that could be used to minimize potential flood damage. These include: designing major treatment equipment such as packed towers and carbon vessels to be floodable; elevation of lightweight, water-sensitive equipment on platforms above the 100-year flood elevation; elevation on fill of the expensive, water-sensitive equipment, such as electrical transformers; or trailer or skid mounting major equipment, such as fans and motors, for removal when floods are expected. Specific floodproofing measures to be utilized would be determined during the design phase.

The intent of EPA drinking water regulations regarding the siting of public water supply system facilities (40 CFR 141.5) is to avoid an interruption of water supply during a natural disaster such as a flood event. Locating the treatment facility in the Bartolo Well Field would subject the system to loss of use during a flooding episode. In addition, there could be a down time of approximately 1-2 months (or more depending on the extent of flood damage) after a flood event to prepare the system to return to operations. In this event, SWS would have to rely on other outside, more expensive sources of water. SWS currently relies on California Domestic Water Company, the Metropolitan Water District of Southern California, the City of Whittier, and La Habra Heights to supply peak and emergency water supply. These sources of water have been used in the past when the Bartolo Transmission Main was totally out of service. Sufficient excess capacity was available in the past and should be available in the future if such a need arises, particularly during the wet winter months (a period of low demand for water supply) when the treatment facility is most likely to be out-of-service due to a flood.

12.0 SUMMARY OF ALTERNATIVES ANALYSIS

Table 4 provides a summary of the analyses of alternatives. The alternatives were evaluated based on nine criteria: (1) overall protection of human health and the environment, (2) short term effectiveness in protecting human health and the environment, (3) long-term effectiveness and permanence in protecting human health and the environment, (4) compliance with ARARs, (5) reduction of toxicity, mobility, or volume of contaminants (this criteria is under the heading "performance of technology" in Table 4), (6) technical and administrative feasibility of implementation, (7) state acceptance, (8) community acceptance, and (9) capital and operation and maintenance costs.

Consideration of Alternative Water Supply

All of the alternatives that were evaluated in detail are capable of meeting the objective of providing water to SWS's customers that meets all federal and state drinking water standards. The alternative water supply alternative, however, does nothing to meet the second objective of helping to control the migration of contaminants. It is also almost twice as costly as any of the extraction and treatment alternatives. Therefore, it has been ruled out based on its cost and its lower effectiveness in protecting human health and the environment.

Treatment Technology

Both the packed tower air stripping and liquid-phase GAC treatment system technologies can treat the contaminated water to the desired levels. In addition, both technologies are virtually equal in protection of human health in that both risks due to exposure of contaminated water and air emissions can be reduced to below the 10^{-6} cancer risk level, although the GAC system would virtually eliminate ozone precursor emissions and exposure to any air emissions in the South Coast Air Basin. All of the GAC alternatives are at least 50% higher in cost than the most costly air stripping alternative. Therefore, the GAC alternatives were ruled out since there is no significant difference in these technologies regarding effectiveness in protecting public health.

TABLE 4

ANALYSIS OF ALTERNATIVES

Alternative	PROTECTION OF HEALTH AND ENVIRONMENT Short Term | Long Term	COMPLIANCE WITH ARARS	PERFORMANCE OF TECHNOLOGY	FEASIBILITY OF IMPLEMENTATION	ACCEPTANCE OF ALTERNATIVE State	ACCEPTANCE OF ALTERNATIVE Community	COST Capital + O & M Total
A: Minimum Air stripping at Main High Point Site	Can Treat to MCLs Residual Risk Water: 1×10^{-5} Air: 6×10^{-7}	Yes	Adequate for Water; Preference for Treatment not Met for Air	Land Must Be Acquired; Likely Delay in Implementation	No	Strong Public Comment in Opposition	1,640,000 4,981,000 6,621,000
B: Maximum Air stripping at High Point with Emission Controls	Can Treat Beyond MCLs Residual Risk Water: 5×10^{-7} Air: 5×10^{-8} (assumes 90% removal) Ozone Precursor emissions also reduced	Yes	Adequate for all media if carbon is regenerated	Land Must Be Acquired; Likely Delay in Implementation	Yes, but additional CEQA requirements must be met	Strong Public Comment in Opposition	4,342,000 10,867,000 15,209,000
C: Minimum Air stripping at Well Field Site	Can Treat to MCLs Residual Risk Water : 1×10^{-5} Air: 2×10^{-7}	Yes	Adequate for Water; Preference for Treatment not Met for Air	Feasible	No	Most Public Comment in Opposition; Central & West Basin Rep. Distr. Supports	1,739,000 5,011,000 6,750,000
D: Maximum Air stripping at Well Field Site	Can Treat Beyond MCLs Residual Risk Water: 5×10^{-7} Air: 2×10^{-7}	Yes	Adequate for Water; Preference for Treatment not Met for Air	Feasible	No	Strong Public Comment in Opposition	2,363,000 6,034,000 8,397,000
E: Maximum Air stripping at Well Field with Emission Controls	Can Treat Beyond MCLs Residual Risk Water: 5×10^{-7} Air: 2×10^{-8} (assumes 90% removal) Ozone Precursor Emissions also reduced	Yes	Adequate for all media if carbon is regenerated	Feasible	Yes	Yes	4,387,000 10,879,000 15,266,000

*30-year present worth O&M cost calculated using a 5% discount factor

TABLE 4
(continued)

ANALYSIS OF ALTERNATIVES

Alternative	PROTECTION OF HEALTH AND ENVIRONMENT Short Term	Long Term	COMPLIANCE WITH ARARS	PERFORMANCE OF TECHNOLOGY	FEASIBILITY OF IMPLEMENTATION	ACCEPTANCE OF ALTERNATIVE State	Community	COST Capital + O & M* Total
F: Dual Bed Carbon Adsorption at Main High Point Site	Can treat beyond MCLs to 10^{-6} risk level; Completely eliminates ozone precursor emissions and exposure to air toxics		Yes	Adequate; Preference for treatment met if carbon is regenerated	Land must be acquired; Likely delay in implementation	No	No Public Comment	10,693,000 15,423,000 26,116,000
G: Dual Bed Carbon Adsorption at Well Field Site	Can treat beyond MCLs to 10^{-6} risk level; Completely eliminates ozone precursor emissions and exposure to air toxics		Yes	Adequate; Preference for treatment met if carbon is regenerated	Feasible	No	No Public Comment	10,221,000 15,277,000 25,498,000
H: Single Bed Carbon Adsorption at Well Field Site	Can treat beyond MCLs to 10^{-6} risk level; Completely eliminates ozone precursor emissions and exposure to air toxics		Yes	Adequate; Preference for treatment met if carbon is regenerated	Feasible	No	No Public Comment	7,433,000 16,176,000 23,609,000
I: Replace Well Supply With Water From MWD	Will meet MCLs for water supply; Does nothing to control migration of contaminants		Yes for ARARs related to water supply	Adequate for water supply; Does not meet preference for treatment	Feasible	No	Little Public Comment; Probably Acceptable	6,388,000 35,752,000 42,140,000
Additional Option For Treatment Alternatives Well Modification	Allows for more efficient use of treatment for control of contaminant migration		Yes	Adequate	Well testing required to determine feasibility of implementation	Yes	Yes	1,042,000 1,553,000 2,595,000

* 30-year present worth O&M cost calculated using a 5% discount factor

Air Stripping Design Treatment Efficiency

The minimum air stripping design alternatives are capable of providing water that meets all federal and state drinking water standards. It is less protective of human health than the maximum air stripping design alternatives since there are multiple contaminants in the groundwater in the Whittier Narrows area so that the residual cancer risk level is 10^{-5} for treated water. For an increased cost of approximately 10-15% in the proposed plan, the maximum air stripping design can reduce the residual risk level by more than an order of magnitude. In addition, the maximum air stripping design would be more protective over the long-term if well modification is implemented since water that is more highly contaminated will be selectively extracted. The levels that may be obtained through selective extraction will be uncertain due to lack of knowledge of the overall sources and extent of contamination in the Whittier Narrows area. A maximum air stripping design will provide better protection in the event a slug of more highly contaminated water reaches the Bartolo well field.

Control of Air Emissions from the Air Stripping System

The cost of including gas-phase GAC treatment of the air stripper off-gas to achieve a 90% reduction of total VOC emissions is approximately 80%. Although this expenditure would reduce the cancer risk level associated with the air emissions by an order of magnitude, uncontrolled emissions pose an estimated risk of only about 5×10^{-7}, toward the low end of EPA's acceptable risk range of 10^{-4} to 10^{-7}. Emission controls would be needed, however, to comply with the requirements of SCAQMD Rule 1167. Although this rule is not now considered an ARAR due to a recent court decision (see §10.0, page 19), it has been considered in the remedy selection process since SCAQMD fully intends to meet the requirements set by the court judgment and proceed toward adoption of this rule as a promulgated, legally enforceable, generally applicable requirement in the near future.

It should be noted that the intent of this rule was to control ozone precursor emissions and the South Coast Air Basin is in nonattainment status with respect to the ozone NAAQS. In fact, the South Coast Air Basin is acknowledged to have the worst ambient air quality with respect to ozone in the nation. Installation of an air stripping system with air emission controls is more protective of the environment in that it will reduce ozone precursor emissions to the atmosphere by 90% and

will support efforts by SCAQMD to reach attainment status for ozone in the South Coast Air Basin.

In addition, public comment submitted to EPA in writing and made by attendees at the public meeting were overwhelmingly in support of including air emission controls regardless of the legal status of Rule 1167 due to the severe air pollution problem already existing in the San Gabriel Valley.

Location of Treatment Facility

The relative advantages and disadvantages of the alternative locations for siting of the treatment facility have been discussed in detail in §11.0--Floodplain Assessment. There would be a risk of flood damage and temporary interruption of service if the the treatment facility is located at the Bartolo Well Field, along with slightly higher costs due to the need to pump the water uphill in the Bartolo Transmission Main. To locate the facility at the high point site, however, would potentially add a long delay to construction of the treatment facility (1-5 years) to allow for acquisition of property. Therefore, its short term effectiveness is substantially less than that for the Bartolo Well Field site since it may not be operational before average contaminant concentrations in the Bartolo Well Field exceed federal and state drinking water standards. In addition, a large amount of contamination may continue to migrate due to a delay in implementing well modifications if the high point site is selected.

The high point site is unacceptable to the community in the vicinity of the proposed treatment plant location as evidenced by the near unanimous public opposition to this location voiced at the public meeting and in written comments submitted to EPA.

Well Modification

Well modification can be included as an option for any of the treatment alternatives. By selectively extracting the most highly contaminated water in the aquifer, the maximum amount of contamination will be removed from the groundwater. This is more protective of human health and the environment in that the amount of contamination that could continue to migrate would be reduced to a greater extent. This would result in a greater attainment of the SARA preference for utilizing treatment for reduction of toxicity, mobility, or volume of contaminants at the site. The cost of well modification is estimated at approximately $2.6 million, which results in about a 17% increase in the cost of the proposed plan.

13.0 THE SELECTED REMEDY

The selected remedy for the SWS Bartolo Well Field Operable Unit includes extraction of contaminated groundwater from the Bartolo Well Field. The existing wells will be modified and/or new production wells will be installed to selectively extract the most highly contaminated groundwater, if further testing during the design phase shows this to be feasible. The treatment technology will be a packed tower air stripping system to be constructed at the Bartolo Well Field site. The treatment system will be equipped with an off-gas vapor-phase GAC treatment system to control air emissions. The treated water will be fed directly into SWS's water distribution system.

Continuation of the extraction of contaminated groundwater from the Bartolo Well Field is chosen as a means of providing water supply for SWS's customers, since it will help to control the spread of contamination in the Whittier Narrows area, unlike the option of using an alternative water supply. Implementation of well modification, if feasible, will maximize the amount of groundwater contamination removed from the Main San Gabriel Groundwater Basin by this response action. This will assist in the control of contaminant migration.

Packed tower air stripping is chosen as the treatment technology because this treatment method provides virtually the same human health protection as the other technology considered with substantially less cost. Air emission controls will be used to reduce the level of VOC emissions. The emission controls are included in the selected remedy because (1) they would be necessary to comply with SCAQMD Rule 1167, which was rescinded as a result of a court judgment in a lawsuit, but for which SCAQMD is fully intending to meet the procedural and substantive requirements of the court judgment to allow promulgation of a legally enforceable requirement, (2) they would reduce the ozone precursor emissions in the most polluted air basin in the nation with respect to ozone air quality, and (3) public comments received were overwhelmingly in favor of including emission controls due to the severe existing air pollution in the San Gabriel Valley, regardless of the legal status of SCAQMD Rule 1167.

The target level of treatment chosen is to achieve a cumulative 10^{-6} cancer risk level. This corresponds with the maximum air stripping design alternative. This level of

treatment, which will result in contaminant levels well below MCLs and DHS action levels in the treated water, is more protective of human health. The choice of an overall 10^{-6} risk level versus treatment to MCLs was made because of: (1) the multiple contaminants in the groundwater in the vicinity of the Bartolo Well Field, (2) the fact that an approximately 10-15% increase in cost could result in a reduction of risk level of over an order of magnitude, and (3) the implementation of well modification to selectively extract the most highly contaminated water may lead to greater uncertainty in the contaminant concentrations of influent water; in this situation, the increased level of treatment will provide additional protection of public health.

In practice, the target level of performance of the treatment system will be to reduce the level of one of the primary VOC contaminants detected in groundwater in the Whittier Narrows area, PCE, to below 1.0 ppb. This corresponds to the 10^{-6} cancer risk level for PCE. In the Public Health Evaluation, the majority of risk was determined to be associated with potential exposure to PCE. Based on the estimated future concentration of PCE and other VOCs in water extracted from the Bartolo Well Field, and the predicted percent removal of different contaminants in an air stripping system, meeting this target level for PCE will reduce the risks associated with exposure to the other contaminants to well below their 10^{-6} cancer risk levels. Therefore, the total cumulative cancer risk level of the treated water will be approximately 10^{-6}. In addition, 1 ppb is a practical target level of performance given the accuracy of current methods of laboratory analysis for VOCs at low level concentrations. The target level--1 ppb--is near the practical limit of detection and quantification for PCE.

The Bartolo Well Field site for the treatment facility was selected as there is no practicable alternative to locating the treatment facility within the 100-year floodplain. The Bartolo Transmission Main high point site is not considered a practicable alternative due to the long delay in implementation that would be incurred to allow for locating and acquiring property for the treatment facility, and due to its vicinity to adjacent residential areas and the lack of public acceptance within the local community. The land acquisition process of DHS could take up to 5 years. This is an unacceptable delay in implementation of the project due to the expected increase in contaminant levels at the Bartolo Well Field and the resulting greater threat to human health and the environment. Public comment submitted in writing to EPA and statements made by attendees at the public

meeting were overwhelmingly against locating the treatment facility at the high point site. Such opposition increases the possibility of delays in DHS completing its land acquisition process since it includes completion of an Environmental Impact Report as part of the CEQA project review process.

Floodproofing measures will be incorporated within the design of the treatment facility at the Bartolo Well Field to minimize the potential damage to the treatment facility during flooding, as well as to limit the downtime necessary after a flood event to prepare the system to return to operations.

The selected remedy is expected to operate over the estimated 30-year design life of the installed equipment. Extraction of contaminated groundwater using the Bartolo wells could be discontinued, however, as part of the Whittier Narrows Operable Unit if it is determined that a more efficient extraction system for the control of contaminant migration in the Whittier Narrows Area should be installed at other locations. If this occurred, treatment of contaminated groundwater would still be conducted at the Bartolo Well Field treatment facility. Whether a treatment system at the Bartolo Well Field will have to operate for a period longer than 30 years will depend on the selected remedy for the Whittier Narrows operable unit and other operable units in San Gabriel Areas 1, 2, and 4. Groundwater monitoring will be conducted as part of the remedy to track contaminant levels at the Bartolo Well Field and to monitor the performance of the treatment system.

The estimated cost of the selected remedy is given in detail in Table 5. These costs reflect the conceptual design described in the OUFS; the cost of the final design could vary, depending on such variables as the specific well modification or floodproofing measures eventually included.

14.0 STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment--as required by Section 121 of CERCLA--in that it treats groundwater to an overall excess risk level of 10^{-6} or less, below the MCLs for the contaminants of concern. In addition, the remedy at least attains the requirements of all ARARs, including the MCLs, the Floodplain Management Executive Order (E.O. 11988), and Safe Drinking Water Act regulations regarding modification of public water supply systems (40 CFR 141.5). The remedy is determined to meet the requirements of E.O. 11988 and 40 CFR 141.5 because locating the treatment

TABLE 5

COST SUMMARY FOR SELECTED REMEDY:
MAXIMUM AIR STRIPPING AT BARTOLO WELL FIELD SITE
WITH OFF-GAS CARBON TREATMENT AND WELL MODIFICATION

Cost Items	Estimated Cost
General	515,000
Mobilization, Bonds, and Insurance	
Construction Admin. Trailer	
Security Service	
Community Relations	
Health & Safety Program	
Permits	
Site Preparation and Construction	2,375,000
Earthwork	
Structures and Equipment	
Piping and Electrical	
Construction Subtotal	2,890,000
Bid and Scope Contingencies	1,156,000
Construction Total	4,046,000
Services During Construction	404,000
Total Implementation Cost	4,450,000
Engineering, Legal, and Admin. Cost	979,000
TOTAL CAPITAL COST	5,429,000
INCREMENTAL ANNUAL O&M COST	809,000
NET PRESENT WORTH OF O&M	
At 3 percent	15,851,000
At 5 percent	12,432,000
At 10 percent	7,623,000
TOTAL NET PRESENT WORTH OF REMEDIAL ACTION	
At 3 percent	21,280,000
At 5 percent	17,861,000
At 10 percent	13,052,000

facility in the floodplain is the only practicable alternative due to the need to take timely action to respond to the threat to human health and the environment posed by groundwater contamination at the Bartolo Well Field.

Packed tower air stripping has been shown to be the most cost-effective technology for treating the VOC contaminants found in the Bartolo Well Field. In addition, the use of well modification is a cost-effective method of maximizing the removal of contaminants from groundwater in the Bartolo Well Field while still providing a water supply for SWS's customers that meets all federal and state drinking water standards after treatment. Although the addition of air emission controls will significantly increase the cost of the selected remedy (by about 80%), it is determined to be justified as a cost-effective measure for the following three reasons: (1) to meet the requirements of SCAQMD Rule 1167, which, although are not currently generally applicable due to a recent court decision, are expected to be generally applicable in the near future; (2) to reduce ozone precursor emissions (the goal of Rule 1167) in a nonattainment area (the South Coast Air Basin) that has the worst ozone air quality in the nation; and (3) in response to overwhelming public comment to incorporate air emissions to minimize the increase in existing air quality problems regardless of legal requirements.

The selected remedy permanently and significantly reduces the mobility and volume of hazardous substances with respect to their presence in groundwater--the contaminants are removed from the groundwater, thereby reducing contaminant migration in the vicinity of the Bartolo Well Field. Packed tower air stripping will result in a small increase in the toxicity, mobility, and volume of hazardous substances with respect to their presence in the air. PCE and TCE, the primary contaminants of concern, are also toxic when inhaled, as well as when ingested. In addition, VOCs are generally more mobile once they become airborne. Finally, air stripping increases the volume of contamination in the air by transferring the volume of contamination that was once in the water into the air.

The inclusion of air emissions controls in the selected remedy, however, reduces the impact of the air emissions in a cost-effective manner to the maximum extent practicable. In addition, the air emissions are estimated to add virtually no risk to the project via airborne contaminants ($<10^{-7}$). The absence of added risk is due largely to (1) dilution of contamination as it exits from the air stripping system, (2) the air emissions controls that will remove about 90% of the contaminants in the air, and (3) the remoteness of the proposed

facility at the Bartolo Well Field site with respect to populated areas. The VOCs that will be emitted from the treatment system are precursor emissions to the formation of ozone in the atmosphere. With the addition of air emission controls, however, the selected remedy reduces the potential for ozone formation to the maximum extent practicable.

To meet the statutory preference for remedies that utilize alternative treatment or resource recovery technologies to the maximum extent practicable, the spent carbon from the GAC off-gas treatment system will be regenerated, if feasible, instead of disposed of in a landfill.

ATTACHMENT A

PROJECTED WATER QUALITY AT SUBURBAN WATER SYSTEMS' BARTOLO WELL FIELD OVER THE 30-YEAR PROJECT LIFE

Compound	Concentration (parts per billion)
Acetone	ND
Benzene	ND - 4
Carbon Tetrachloride (CTC)	1 - 3
Chloroform	1 - 3
1,1-Dichloroethane (1,1-DCA)	1 - 1
1,2-Dichloroethane (1,2-DCA)	1 - 1
1,1-Dichloroethylene (1,1-DCE)	1 - 4
1,2-Dichloroethylene (1,2-DCE)	1 - 10
cis-1,2-Dichloroethylene (cis-1,2-DCE)	3 - 28
trans-1,2 Dichloroethylene (trans-1,2-DCE)	2 - 35
Tetrachloroethylene (PCE)	2 - 36
Toluene	1 - 2
Total Trihalomethanes	1 - 8
1,1,1-Trichloroethane (1,1,1-TCA)	1 - 8
Trichloroethylene (TCE)	2 - 21
Vinyl Chloride	ND
Xylenes	ND - 1